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Kraft Pulp Mill Compliance Assessment Guide
(CAA, CWA, RCRA and EPCRA)

United States Environmental Protection Agency
Office of Enforcement and Compliance Assurance
Office of Compliance
Manufacturing, Energy and Transportation Division

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List of Acronyms

Acronym	Term	Regulatory Program (Context)
ACM	Asbestos Containing Material	CAA (hazardous material)
ADI	Applicability Determination Index	CAA (EPA database)
AIRS	Aerometric Information Retrieval System	CAA (EPA database)
AOX	Adsorbable Organic Halides	NPDES (pollutant)
ASTM	American Society for Testing and Material	N/A (test method source)
BACT	Best Available Control Technology	CAA (technology-based emission limit)
BAT	Best Available Technology Economically Achievable	NPDES (technology-based effluent standard for toxic and non-conventional pollutants)
BCT	Best Conventional Pollutant Control Technology	NPDES (technology-based effluent standard for conventional pollutants)
BLO	Black Liquor Oxidation	N/A (TRS emissions control method)
BPT	Best Practicable Control Technology Currently Available	NPDES (technology-based effluent standard for all pollutants)
BMP	Best Management Practice	N/A (regulatory work practice)
BOD_5	Biochemical Oxygen Demand	NPDES (pollutant)
CAA	Clean Air Act	CAA
CAM	Compliance Assurance Monitoring	CAA
CBI	Confidential Business Information	N/A
CCA	Clean Condensate Alternative	CAA (pollution prevention-based-regulatory-alternative)
CDI	Case Development Inspection	RCRA (inspection type)
CEI	Compliance Evaluation Inspection	NPDES/RCRA (inspection type)
CEMS	Continuous Emission Monitoring System	CAA
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	CERCLA

List of Acronyms (cont.)

Acronym	Term	Regulatory Program (Context)
CESQG	Conditionally Exempt Small Quantity Generator	RCRA (category of hazardous waste generating facility)
CFR	Code of Federal Regulations	N/A
CME	Comprehensive Groundwater Monitoring Evaluation	RCRA (inspection type)
CMS	Continuous Monitoring System	CAA (Part 63 NEHSAP monitoring system)
COD	Chemical Oxygen Demand	NPDES (pollutant)
CSI	Compliance Sampling Inspection	NPDES/RCRA (inspection type)
CWA	Clean Water Act	CWA
DCE	Direct Contact Evaporator	N/A (kraft mill recovery furnace type)
DCS	Distributed Control Systems	N/A (automated data handling system)
DI	Diagnostic Inspection	NPDES (inspection type)
DMR	Discharge Monitoring Report	NPDES
DOT	Department of Transportation	N/A
D&R	Demolition and Renovation	CAA (asbestos-related term)
ECF	Elemental Chlorine-free	N/A (pulp bleaching term)
EER	Excess Emission Report	CAA
EPA	Environmental Protection Agency	N/A
EPCRA	Emergency Planning and Community Right-to-Know Act	EPCRA
ERNS	Emergency Response Notification System	EPCRA (database of reported spills)
ESP	Electrostatic Precipitator	N/A (particulate matter control device)
FIP	Federal Implementation Plan	CAA (plan for attaining NAAQS)
FR	Federal Register	N/A
HAP	Hazardous Air Pollutant	CAA

List of Acronyms (cont.)

Acronym	Term	Regulatory Program (Context)
HSWA	Hazardous and Solid Waste Amendments	RCRA
HVLC	High Volume, Low Concentration	CAA (TRS emissions category)
IDEA	Integrated Data for Enforcement Analysis System	N/A (EPA multimedia compliance database)
LAER	Lowest Achievable Emission Rate	CAA (technology-based emission standard)
LDR	Land Disposal Restrictions	RCRA (hazardous waste pretransportation requirements)
LEPC	Local Emergency Planning Committee	EPCRA
LQG	Large Quantity Generator	RCRA (category of hazardous waste generating facility)
LSI	Legal Support Inspection	NPDES (inspection type)
LVHC	Low Volume, High Concentration	CAA (TRS emissions category)
MACT	Maximum Available Control Technology	CAA (technology-based hazardous air pollutants emission standard)
MEE	Multiple Effect Evaporator	N/A (kraft mill recovery furnace component)
MLVSS	Mixed Liquor Volatile Suspended Solids	CAA (biological treatment system parameter)
MRR	Monitoring, Reporting, and Recordkeeping	N/A
MSDS	Material Safety Data Sheet	EPCRA
MSGP	Multi-sector General Permit	NPDES (industrial storm water permit type)
NAAQS	National Ambient Air Quality Standards	CAA (health-based standards for criteria pollutants)
NCG	Noncondensible Gas Stream	N/A
NDCE	Non-direct Contact Evaporator	N/A (kraft mill recovery furnace type)
NEIC	National Enforcement Investigations Center	N/A
NESHAP	National Emission Standards for Hazardous Air Pollutants	CAA

List of Acronyms (cont.)

Acronym	Term	Regulatory Program (Context)
NO_x	Nitrogen Oxide	CAA (pollutant)
NPDES	National Pollution Discharge Elimination System	NPDES (permitting program)
NRC	National Response Center	CERCLA (hazardous substance release reporting center)
NSPS	New Source Performance Standards	CAA and NPDES (technology-based standards)
NSR	New Source Review	CAA (regulatory program)
OAQPS	Office of Air Quality Planning and Standards	N/A
OC	Office of Compliance	N/A
ODP	Oven Dried Pulp	N/A
O&M	Operation and Maintenance	N/A
ORP	Oxidation Reduction Potential	CAA (bleach plant scrubber monitoring parameter)
PAI	Performance Audit Inspection	NPDES (inspection type)
PCI	Pretreatment Compliance Inspection	NPDES (inspection type)
PCS	Permit Compliance System	NPDES (EPA database)
PERM	Program for Effective Residuals Management	NPDES (permit-specific requirement)
PM	Particulate Matter	CAA (pollutant)
POTW	Publicly Owned Treatment Works	NPDES
PHA	Process Hazard Analysis	CAA (RMP element)
PSD	Prevention of Significant Deterioration	CAA (type of NSR permitting program)
PSES	Performance Standards for Existing Sources	CAA (emission limits)
	Pretreatment Standards for Existing Sources	NPDES (technology-based pretreatment standards))
PSNS	Performance Standards for New Sources	NPDES (emission limits)
	Pretreatment Standards for New Sources	NPDES (technology-based pretreatment standards)

List of Acronyms (cont.)

Acronym	Term	Regulatory Program (Context)
QA/QC	Quality Assurance/Quality Control	N/A
RACM	Reportable Asbestos Containing Material	CAA (hazardous material)
RACT	Reasonably Available Control Technology	CAA (technology-based emission limits)
RCRA	Resource Conservation and Recovery Act	RCRA
RCRIS	Resource Conservation and Recovery Information System	RCRA (EPA database)
RI	Reconnaissance Inspection	NPDES (inspection type)
RMP	Risk Management Plan	CAA (regulatory program)
RQ	Reportable Quantity	CERCLA/EPCRA (reporting threshold for hazardous/extremely hazardous chemical releases)
SARA	Superfund Amendments Reauthorization Act	EPCRA
SERC	State Emergency Response Commission	EPCRA
SIP	State Implementation Plan	CAA (plan for attaining NAAQS)
SFIP	Sector Facility Indexing Project	N/A
SFR	Steam-to-Feed Ratio	CAA (steam stripper monitoring parameter)
SPCC	Spill Prevention Control and Countermeasure	NPDES (oil discharge prevention/control plan)
SQG	Small Quantity Generator	RCRA (category of hazardous waste generating facility)
SSM	Startup, Shutdown or Malfunction	N/A
SWPP	Storm Water Pollution Prevention	NPDES (plan for control of storm water discharges)
TADP	Tons of Air Dried Pulp	N/A (unit of measurement)
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin	NPDES (pollutant)
TCDF	2,3,7,8-tetrachlorodibenzo-p-furan	NPDES (pollutant)
TCF	Totally Chlorine Free	N/A (pulp bleaching method)

List of Acronyms (cont.)

Acronym	Term	Regulatory Program (Context)
TCLP	Toxicity Characteristics Leaching Procedure	RCRA (method for determining hazardous waste characteristic)
TMDL	Total Maximum Daily Load	NPDES (method of quantifying allowable pollutant loadings)
TOC	Total Organic Carbon	NPDES (pollutant)
T-R	Transformer-rectifier	CAA (electrostatic precipitator component)
TRI	Toxic Release Inventory	EPCRA
TRS	Total Reduced Sulfur	CAA (pollutant)
TSD/TSDF	Treatment, Storage or Disposal/Treatment, Storage or Disposal Facility	RCRA (hazardous waste facility type)
TSI	Toxics Sampling Inspection	NPDES (inspection type)
TSP	Total Suspended Particulates	CAA (pollutant)
TSS	Total Suspended Solids	NPDES (pollutant)
UST	Underground Storage Tank	RCRA
VATIP	Voluntary Advanced Incentives Program	CWA (Cluster Rules pollution prevention program)
VEO	Visible Emission Observation	CAA (opacity inspection technique)
VOC	Volatile Organic Compound	CAA/NPDES (pollutant)
WBL	Weak Black Liquor	N/A (pulping process chemical)
W.C.	Water in Column	N/A (unit of measurement for air pressure)
WQBEL	Water Quality-based Effluent Limits	NPDES

INTRODUCTION

The Office of Compliance (OC) of the U.S. Environmental Protection Agency (EPA) was created in 1994 as a multi-media office organized around various industry sectors. Among other responsibilities, OC is charged with assisting State, local and federal agency personnel carry out their compliance oversight functions, as well as with providing compliance assistance to the regulated industry. To help accomplish its mission, OC developed a series of 18 profiles on various industry sectors (as defined by two digit Standard Industrial Classification (SIC) codes). Each profile (or sector notebook) provides an overview of the types of production processes within a sector, the associated environmental discharges, and the types of compliance requirements that apply generally to facilities within each sector. The EPA published the *Profile of the Pulp and Paper Industry* in September 1995.

Building upon this initial effort, this manual has been developed to assist both agency and plant personnel in conducting compliance assessments of kraft pulp mill facilities. The Office of Compliance has selected this type of facility for several reasons. First, the pulp and paper industry sector ranks as one of the most heavily inspected industry sectors by State and EPA inspectors. Second, within the pulp and paper sector, the kraft process represents the single largest portion of the pulp production in the U.S. (approximately 80%). Third, the pulp and paper sector has recently become subject to new requirements under a combined air and water pollution regulation commonly referred to as the "Cluster Rules." The Cluster Rules were promulgated at 63 FR 18504, April 15, 1998. Since then, EPA has released clarifications and technical amendments (see 63 FR 42238, August 7, 1998; 63 FR 49455, September 16, 1998; 63 FR 71385, December 28, 1998; and 64 FR 17555, April 12, 1999). If the Agency releases any further amendments to the Cluster Rules, EPA will post information on the amendments on the EPA website (see page 1-4 of this manual for specific website addresses for Cluster Rules information).

Although this document includes summaries of various regulatory provisions and requirements, it does not change existing regulations and should not be interpreted to affect in any manner the responsibilities of affected regulated sources to comply with applicable statutes and regulations. It is intended only to outline regulatory requirements that apply to kraft pulp mills and suggest various techniques of assessing compliance with those requirements. It is not a substitute for regulations published by EPA in the Code of Federal Regulations (CFR), any regulations promulgated by State and local governments, or any specific permit requirements.

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SECTION 1: OVERVIEW

1.1 Regulatory Programs Covered

This manual assists agency and industry personnel in conducting assessments of compliance at kraft pulp mills with environmental requirements developed under the following federal statutes: the Clean Air Act (CAA), Clean Water Act (CWA), and Resource Conservation and Recovery Act (RCRA). The manual also briefly covers reporting and notification requirements under the Emergency Planning and Community Right-to-Know Act (EPCRA) and section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (a parallel reporting section to EPCRA section 304). Although individual State requirements are not evaluated or outlined in detail, the manual does present general information on the types of State requirements that may apply under regulations or in specific permits.

1.2 Multi-media Components

As noted above, the manual addresses multiple pollutant media. Because many agency inspection programs are not organized in a multi-media fashion, the manual is formatted to allow for multi-media or single media inspections. Consistent with existing EPA guidance, the manual suggests specific opportunities for conducting multi-media screening efforts as part of a single media inspection. In particular, the manual highlights various opportunities for screening inspections involving hazardous waste concerns under RCRA, and reporting and notification requirements under EPCRA/CERCLA. The *Profile of the Pulp and Paper Industry* indicates that 10 percent or less of agency inspections of pulp mills are RCRA-oriented inspections. For most other major industries, the level of RCRA inspections ranges from 35-60 percent of total inspections.[1] This relatively low level of inspections in part reflects that most kraft pulp mills are subject to RCRA only as generators of hazardous waste because they do not operate RCRA-regulated treatment, storage or disposal (TSD) facilities. In fact, some large kraft mills may qualify as small quantity generators of hazardous waste. Because of this status, there is an increased value in conducting screening inspections by other media inspectors. Similarly, EPCRA/CERCLA requirements present a multi-media opportunity where the resources to conduct a media-specific inspection by an agency are limited.

Based on generally applicable multi-media screening checklists developed by EPA,[2] this manual develops some specific multi-media assessment techniques appropriate for RCRA and EPCRA/CERCLA assessments at kraft pulp mills. However, this manual is not intended to establish a presumption or requirement that State and local agency inspectors must conduct multi-media screening inspections.

1.3 Process-based Approach

This manual focuses on the individual processes at a kraft mill. For each process, the manual describes the:

- Basic production cycle,
- Emissions effluents and other discharges that are generated,
- Regulations that limit and require monitoring of those various discharges, and
- Procedures for how to evaluate the process and controls in order to evaluate compliance with those regulations.

The manual breaks the typical kraft mill down into the following processes: (1) pulping operations; (2) chemical recovery; (3) bleach plant operations; (4) wastewater treatment operations; (5) power facilities; and (6) woodyard, papermaking, and other general mill operations. Special operations that may occur at kraft pulp mills, such as hazardous waste cleanup efforts, are not covered by this manual. Also, because most kraft mills are direct water dischargers, the discussion of water discharge issues in this manual focuses on mills with direct discharge National Pollution Discharge Elimination System (NPDES) permits rather than mills that are indirect dischargers to a publicly owned treatment works (POTW). However, indirect discharger requirements are discussed where appropriate.

1.4 Pollution Prevention Issues

There are circumstances in which the likelihood that a process may cause compliance problems will decrease based on various process and design characteristics. For instance, total reduced sulfur (TRS) emissions from a recovery boiler may be more of a concern where a source relies on a direct contact evaporator process as opposed to a non-direct contact evaporator process. In attempting to prioritize limited agency inspection resources, an agency inspector may want to consider these types of process issues in defining the scope and depth of inspections of various processes at a plant. The EPA notes, however, that this manual is not intended to serve as a guide to conducting pollution prevention opportunity assessments or as a resource on pollution prevention measures in the pulp and paper sector. The EPA has developed such materials in the past specifically for the pulp and paper sector (see the Sector Information Resources section below for relevant materials). Pollution prevention measures are discussed in this manual as relevant to conducting inspections under the various media.

1.5 Scope Limitations

This manual does not focus on features of certain procedures and issues associated with conducting compliance inspections. First, safety considerations and precautions are of paramount importance in conducting assessments of any facility, including kraft pulp mills.

The basic inspection manuals for the air, water and waste programs (see the References for Section 2) cover these concerns in detail, and those or similar materials should be reviewed by anyone that may be considering conducting an on-site compliance assessment. Other general features of agency inspections are not covered in detail in this manual but are covered in the general media-specific manuals. These include topics such as: obtaining the right to enter onto a facility or obtaining a warrant if entry is refused; and specific documentation procedures for supporting enforcement proceedings. Although these issues are important concerns for an agency inspector, they are addressed at length in basic inspection technique guidance materials. An agency inspector should consult those other sources for a discussion of these topics.

1.6 Sector Information Resources

This manual is one element in a broad spectrum of materials that are available related to environmental compliance and compliance assessment at kraft pulp mills. The following Figure 1-1 illustrates some of the information currently available, as well as other information resources the agency plans to develop in connection with the Cluster Rules. Following Figure 1-1, the manual provides a summary of each resource and how to obtain the resource or more information on the resource.

Figure 1-1
Information Resources Map

General Information	! Profile of the Pulp and Paper Industry ! Cluster Rules Supporting Documents ! Spent Pulping Liquor BMP Support Document ! Handbook for Pulp and Paper Technologists
Regulatory Information	! Cluster Rules Enabling Documents ! EPA Internet Homepage ! State Regulatory Websites ! Applicability Determination Index
Inspection Manuals	! Baseline Inspection Techniques ! ESP O&M Manual ! Air Compliance Inspection Manual ! 1983 Kraft Pulp Mill Inspection Guide ! NPDES Compliance Inspection Manual ! Revised RCRA Inspection Manual ! Program Audit Protocols

Figure 1-1 (cont.)
Information Resources Map

Compliance/Emissions Data	! SFIP ! AIRS ! RCRIS ! Envirofacts	! IDEA ! PCS ! TRI Data ! ERNS
Pollution Prevention	! Pollution Prevention Technologies for Bleached Kraft Mills (1993) ! Model Pollution Prevention Plan for Kraft Pulp Mills (1992) ! Simpson Tacoma Pollution Prevention Plan (1992) ! Industry Websites	

- **Profile of the Pulp and Paper Industry.** The EPA Office of Compliance developed this document (EPA/310-R-95-015) in 1995 as part of EPA's sector notebook project. This notebook provides a sector-based profile of air, water, and land pollution regulations for the pulp and paper industry. The notebook reflects EPA's desire to move toward comprehensive sector-based compliance programs for all industrial sectors. The notebook includes a detailed discussion of pulp and paper industrial processes, chemical profiles, and pollution prevention opportunities; a summary of applicable federal statutes and regulations, compliance history and initiatives; and resource lists. *See http://www.epa.gov/oeca/sector.*

- **Cluster Rules Supporting Documents.** In support of the proposed and final cluster rules, EPA developed technical support documents for both the water and air issues involved in the rulemaking. These documents present the information and rationale supporting the maximum available control technology (MACT) standards and the effluent limitations guidelines and standards for the cluster rules. The documents provide background information on industrial processes and regulatory requirements; summarize data collection methods; provide a detailed overview of air emission and wastewater characteristics, and the selection of pollutant parameters; and discuss pollution prevention and control standards and technologies, including cost estimates. *See http://www.epa.gov/ost/pulppaper for water documents, and http://www.epa.gov/ttn/oarpg and www.epa.gov/ttn/uatw/pulp/pulppg.html for air documents. The preamble and rules themselves are available electronically from the Government Printing Office website, http://www.gpo.gov/su_docs/aces/aces140.html.*

- **Spent Pulping Liquor BMP Support Document.** This 1997 document (*Technical Support Document for Best Management Practices for Spent Pulping Liquor Management, Spill Prevention and Control* (EPA-821-R-97-011, 10/97)) was prepared during the development of the final Cluster Rules and provides the technical background for BMP programs applicable to spent pulping liquor management, spill prevention, and control at pulp and paper facilities. The document includes chapters discussing wood pulping processes and chemical recovery systems; the composition, toxicity, and source of spent pulping liquor; current industry pollution control practices; and BMP implementation, with estimated costs and effluent reduction benefits. *See http://www.epa.gov/ost/rules/#final.*

- **Handbook for Pulp & Paper Technologists (2d ed. 1992).** This handbook, written by pulp and paper expert G.A. Smook, provides technical information relevant to pulp and paper processes, and includes information on the economic and environmental benefits of various pollution minimization efforts. *See http://www.tappi.org for information on obtaining a copy of this handbook.*

- **Cluster Rules Enabling Documents.** The EPA is in the process of developing a variety of documents to assist in the implementation of the Cluster Rules, including the *Pulp and Paper NESHAP: A Plain English Description* (EPA-456/R-98-008, 11/98). Other documents being prepared include an NPDES permit writers guide and a question and answer document on the NESHAP. These documents are expected to be available through the EPA Internet Homepage *(http://www.epa.gov),* at the locations noted previously for the Cluster Rules Supporting Documents.

- **EPA Internet Homepage.** The EPA Homepage *(http://www.epa.gov)* provides a wealth of information relevant to environmental compliance issues and provides links to other important website locations, such as the online version of the daily Federal Register and the Enviroene website *(http://es.epa.gov),* which includes materials developed by EPA's Office of Enforcement and Compliance Assurance.

- **State Regulatory Websites.** Many States have made their regulations and other relevant materials available on the Internet. Even if the regulations are not available, the Internet websites generally provide appropriate contact information to obtain regulatory updates. Figure 1-2 lists the website addresses for the relevant States that either have kraft pulp mills or have promulgated specific kraft pulp mill regulations. For links to various State regulatory resources on-line, *see http://www.paintcenter.org,* a website resource developed by the National Center for Manufacturing Sciences that was made possible by funding from EPA.

Figure 1-2
Website Addresses for State Agency/Regulatory Information

State/Local Agency	Website Address (http:// prefix unless noted)	Rules Available? (as of 4/99)
Alabama	www.adem.state.al.us	Yes
California Districts (air and water)	www.arb.ca.gov/homepage.htm, www.swrcb.ca.gov	Yes
Florida	www.dep.state.fl.us	Yes
Georgia	www.ganet.org/dnr	Yes
Idaho	www2.state.id.us/adm/adminrules/index.htm	No
Kentucky	www.state.ky.us/agencies/nrepc/dep/dep2.htm	Yes
Maine	www.state.me.us/dep	Yes
Maryland	www.mde.state.md.us	No
Michigan	www.deq.state.mi.us	Yes
Mississippi	www.deq.state.ms.us	Yes
Montana	www.deq.state.mt.us	No
New Hampshire	www.state.nh.us/des	Partial
North Carolina	www.ehnr.state.nc.us/ehnr	Yes
Ohio	www.epa.ohio.gov	Yes
Oregon	www.deq.state.or.us	Yes
Pennsylvania	www.dep.state.pa.us	No
South Carolina	www.state.sc.us/dhec/division2.htm	No
Tennessee	www.state.tn.us/environment	Partial
Texas	www.tnrcc.state.tx.us	Yes
Virginia	www.deq.state.va.us	Yes
Washington	www.wa.gov/ecology	Yes
Wisconsin	www.dnr.state.wi.us	Yes

! **Applicability Determination Index (ADI).** This database contains EPA determinations related to the applicability of most federal air regulatory programs, including NSPS and MACT determinations relevant to the kraft pulp mill sector. *See http://www.epa.gov/oeca for electronic access and further details.*

! **Baseline Inspection Techniques.** This student manual (1996, 2d ed.) was designed to be used as instructional material in EPA's Air Pollution Training

Institute (APTI) Course 445, *Baseline Inspection Techniques*. The manual covers use of baseline techniques in lieu of direct measurement to evaluate the performance of air pollution control systems controlling various emission sources. The manual contains chapters that provide recommended inspection procedures for each of the major types of air pollution control devices and processes. *See http://www.epa.gov/airprogm/oar/oaqps/eog/obtain.html for further details on obtaining APTI course materials.*

- **ESP O&M Manual.** This EPA manual (*Operation and Maintenance Manual for Electrostatic Precipitators* (EPA/625/1-85/017)) summarizes available information on ESP theory and design, discusses performance monitoring and the evaluation of control system performance, summarizes methods and procedures for inspection of ESP systems, presents guidelines for general O&M practices and procedures, and outlines a model O&M plan. The manual is designed as an educational tool for plant engineers, O&M personnel, and agency inspectors. Appendix B of the manual addresses ESP applications for kraft recovery furnaces. *Contact NTIS (1-800-553-NTIS) to order a hardcopy version of this report.*

- **Air Compliance Inspection Manual.** This manual (EPA-340/1-85-020) was published by EPA's Office of Air Quality Planning and Standards in 1985 to support inspectors in conducting field inspections necessary to promote stationary source compliance with air quality standards. The manual provides standard inspection procedures, with an emphasis on the evaluation of particulate emission sources, and also provides a discussion of applicable regulations and inspector responsibilities and liabilities. *Contact NTIS (1-800-553-NTIS) to order a hardcopy version of this report.*

- **1983 Kraft Pulp Mill Inspection Guide.** This guide, published in 1983 by EPA's Division of Stationary Source Enforcement (refer to Work Assignment No. 65, Contract No. 68-01-6310), provides technical information and data to support State and local inspectors in the evaluation of both new and existing kraft pulp mills. The guide is divided into three substantive sections. Those sections outline pre-inspection activities and necessary safety precautions; provide a detailed discussion of six major processes or systems within kraft pulp mills (woodhandling, pulping, chemical recovery, causticizing, power boilers, and other sources), noting applicable inspection procedures; and provide compliance determination guidance. *Contact NTIS (1-800-553-NTIS) to order a copy of this report.*

- **NPDES Compliance Inspection Manual.** This 1994 EPA manual (EPA-300-B-94-014) was developed to support wastewater inspection personnel in conducting NPDES field inspections, and to provide standardized inspection procedures. The manual encourages a consolidated inspection approach, and is organized in two parts. The first part addresses basic inspection components, including technical information on documentation, recordkeeping and reporting, sampling, and laboratory procedures. The second part provides information on specific types of inspections, concluding with a discussion of multi-media concerns. *Contact NTIS (1-800-553-NTIS) to order a copy of this report.*

! **Revised RCRA Inspection Manual.** This 1993 manual (Order No. EPA 530R94007) was developed by the RCRA Enforcement Division for use by agency inspectors. The manual describes the scope of inspector authorities and responsibilities, provides a detailed overview of the elements of RCRA compliance inspections (including checklists), establishes standard inspection procedures, and presents essential regulatory information. The EPA has also developed additional RCRA inspection training materials that can be accessed electronically. *Contact NTIS (1-800-553-NTIS) for a copy of the manual, and see http://www.epa.gov/oeca/polguid for other RCRA inspection materials.*

! **Program Audit Protocols.** The Office of Enforcement and Compliance Assurance has developed audit protocols for some of the primary EPA regulatory programs, including CERCLA, RCRA-Generators, and EPCRA. Protocols for the CAA and CWA are scheduled for completion in December 1999. *See http://www.epa.gov/oeca/ccsmd/profile.html for further details.*

! **Sector Facility Indexing Project (SFIP).** The SFIP is a pilot data integration effort initiated by EPA's Office of Enforcement and Compliance Assurance that synthesizes environmental records from several compliance-related data sources into a system that allows facility-level and sector analysis. The SFIP is currently a pilot project covering five industry sectors, including the pulp mill sector. The SFIP provides the public with better access to compliance-related information and allows for sector-based analyses. *See http://www.epa.gov/oeca for further details.*

! **AIRS.** The Aerometric Information Retrieval System (AIRS) is EPA's primary national database for air quality, emissions, compliance, and enforcement information. The AIRS Facility Subsystem (AFS) contains the emissions and compliance data on regulated air pollution sources. Public access is available by obtaining a mainframe account on EPA's National Computer Center. *See http://www.epa.gov/airs for further details.*

! **RCRIS.** The Resource Conservation and Recovery Information System (RCRIS) contains information that identifies and locates entities that handle hazardous waste, as well as providing compliance-related information. *See http://www.epa.gov/epaoswer/hazwaste/data for further details.*

! **Envirofacts.** The Envirofacts Warehouse provides access to several EPA databases (that would otherwise require a mainframe account to access), and also provides tools for users to easily access the information in these databases. In addition to Program data, Envirofacts includes spatial and demographic databases to enable geo-demographic analyses. *See http://www.epa.gov/enviro/html/ef_overview.html for further details.*

- **IDEA.** The Integrated Data for Enforcement Analysis System (IDEA) is an interactive data retrieval and integration system developed by EPA's Office of Enforcement and Compliance Assurance. Users can retrieve data for performing multimedia analyses of regulated facilities, produce compliance histories of individual facilities, identify a group of facilities that meet user-defined criteria, and produce aggregated data on selected industries. Public access is available by obtaining a mainframe account on EPA's National Computer Center. *See http://www.epa.gov/oeca/idea for further details.*

- **PCS.** The Permit Compliance System (PCS) is a national information system that automates entry, updating, and retrieval of NPDES data, and tracks permit issuance, permit limits, and monitoring data for NPDES facilities. Public access is available by obtaining a mainframe account on EPA's National Computer Center. *See http://www.epa.gov/oeca/datasys for further details.*

- **TRI Data.** The Toxics Release Inventory (TRI) provides the public with information on toxic chemicals being used, manufactured, transported, or released into the environment. See *http://www.epa.gov/opptintr/tri* for access to numerous TRI topics, including: "What is TRI," "Accessing and Using TRI Data," "Tri Forms and Reporting Requirements," "TRI chemicals," "TRI Program Development," "TRI National and International Programs," "TRI Contacts," and "What's New with TRI." *See http://www.epa.gov/opptintr/tri/ttpubacc.htm to learn more about TRI information found on CD-ROM, the Right-to-Know Network (RTK NET), Envirofacts, TOXNET (user fee), and TRI User Support (TRI-US).*

- **ERNS.** Through The Emergency Response Notification System, EPA maintains a database of reported spills of oil and other materials. *See http://www.epa.gov/docs/ernsacct for further details.*

- **Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry (1993).** This report, published in 1993 by EPA's Office of Pollution Prevention and Toxics (EPA/600/R-93/110), provides a detailed description of pollution prevention techniques for kraft pulp and paper facilities. *Contact NTIS (1-800-553-NTIS) to order a hardcopy version of this report.*

- **Model Pollution Prevention Plan for the Kraft Segment of the Pulp and Paper Industry (1992).** This document, a product of EPA's Industrial Pollution Prevention Project (EPA 910/9-92-030), provides a model pollution prevention plan for the kraft segment of the pulp and paper industry as a whole. The model plan was developed after implementation of a specific plan for the Simpson Tacoma Kraft Mill. *Contact NTIS (1-800-553-NTIS) to order a hardcopy version of this report.*

- **Simpson Tacoma Pollution Prevention Plan (1992).** This report (*Pollution Prevention Opportunity Assessment and Implementation Plan for Simpson Tacoma Kraft Company, Tacoma, Washington* (EPA 910/9-92-027)) reflects a specific pollution prevention opportunity assessment and voluntary implementation plan for a single kraft pulp mill that was used as a model for developing other plans. *Contact NTIS (1-800-553-NTIS) to order a hardcopy version of this report.*

- **Other Pulp & Paper Websites.** The Technical Association of the Pulp and Paper Industry maintains a website on the Internet *(http://www.tappi.org)* that provides references to available pollution prevention materials as well as links to other related websites, such as the sites maintained by the National Council of the Paper Industry for Air and Stream Improvement *(http://www.ncasi.org)* and the American Forest and Paper Association *(http://www.afandpa.org)*.

References:

1. *Profile of the Pulp and Paper Industry* (EPA/310-R-95-015), EPA Office of Compliance Sector Notebook Project, U.S. Environmental Protection Agency, September 1995.

2. Memorandum, S.A. Herman, Office of Enforcement, Assistant Administrator, to Regional Administrators and Headquarters Compliance Program Directors, May 1993, attaching Multimedia Screening Inspection Program Guidance and National Checklist (5/12/93). Reproduced as Appendix T in NPDES Compliance Inspection Manual (EPA 300-B-94-014).

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SECTION 2: ASSESSMENT OBJECTIVES AND TYPES

2.1 Objectives

The appropriate tasks to perform in conducting a compliance assessment will depend on the goal(s) of the assessment. The three primary goals that may apply which are discussed in this manual are:

- **Permit verification.** Determine that the permit appropriately reflects current process operations and includes all necessary components. Check to ensure that the permit reflects all applicable regulatory requirements. Evaluate whether the mill has applied for all necessary permits or permit revisions associated with source modifications.

- **Compliance assessment.** Conduct general assessment of compliance with applicable requirements. May include direct compliance assessments (sampling or testing for emission limitations and verification of proper implementation of work practice/operating requirements) or indirect compliance assessments (control device/process operation and maintenance, observation of general housekeeping practices, laboratory QA/QC checks, etc.).

- **Root cause evaluations.** Perform follow-up investigation after a problem is identified to determine cause (such as follow-up to wastewater treatment plant upset or to increased emissions levels reported from a CEMS).

Other objectives of an inspection may apply, but are generally considered beyond the scope of this manual. These include:

- Observing compliance tests or certification tests for self-monitoring equipment.
- Conducting assessments in support of/response to specific enforcement actions.
- Gathering data to support development of new/revised regulations or permit renewals.

2.2 Available Techniques

There are four basic methods of conducting an inspection: visual (or odor) observation, record reviews, interviews with facility personnel, and sampling/testing activities.

- **Visual and odor observations.** Visual (and odor) observations serve two important functions. In many situations, visual observations can serve as a direct determination of compliance. For instance, compliance with work practice requirements under RCRA or the air program can be determined in many cases based on visual observations alone. The second use of visual or odor observations is as an indirect screening tool. By observing general plant conditions, detecting odor problems, or observing specific conditions of key discharge points and controls, an inspector can identify indications of potential problems at the facility. Generally, this type of assessment should be linked with other techniques, such as record reviews, to provide a more complete assessment of compliance. Photo or video documentation should be used when appropriate or necessary.

- **Record reviews.** Review of records is an important element of most inspections. Appropriate file records, including permits, monitoring reports and previous inspection reports, should all be evaluated prior to conducting the inspection. On-site records should be reviewed during the inspection to assess current operations and to verify that recordkeeping obligations are met. For both the RCRA and NPDES programs, records, including monitoring reports, often allow for direct compliance determinations without further analysis. For the air program, continuous monitoring data has been more limited, and visual observations, especially for particulate matter emissions, have played an increased role in compliance assessments. As the air program moves toward the NPDES model with expanded monitoring and compliance certification in Title V operating permits, record reviews will continue to increase in importance.

- **Interviews.** An initial step in the assessment process might involve in-depth interviews with facility staff in the target process areas. Interviews should cover what discharges and waste streams are associated with the process and how these discharges and waste streams are managed to stay within compliance. To the extent process conditions are important to maintaining compliance, interviews should elicit detailed information about expected normal operating conditions and how potential process upset conditions are monitored, prevented and, if necessary, corrected. For an agency inspection, the opening conference is an appropriate time to discuss what types of interviews are expected during the inspection.

NOTE! Distributed control systems (DCS) in pulp mill operations provide an excellent opportunity to merge effective plant interviews with record reviews. In the control rooms for various processes, a DCS can provide real-time and trend data analyses during an inspection. Interviews with plant operators can enhance the use of the DCS to obtain relevant information and to analyze the information provided by the DCS.

- **Sampling/testing.** In all three main program areas, actual sampling or testing in the conduct of a typical compliance assessment is limited. However, sampling or testing methods usually serve as the benchmark for determining compliance and, where necessary, should be performed where an accurate assessment is difficult to perform and a significant risk of noncompliance or other problem exists.

Each of the three basic media programs -- air, water and hazardous waste -- has developed general, media-specific inspection procedures that incorporate all of these techniques to some degree. In each case, the media programs use standardized nomenclature for various types and degrees of inspections. In addition, multi-media inspection guidance developed by EPA has established additional standard elements of different types of multi-media inspections. The following sections provide a brief overview of these various existing inspection types and identify several common elements and some unique characteristics.

2.3 Air Inspections

The EPA's 1985 Compliance Inspection Manual[1] identifies four categories of air compliance inspections (Levels 1 through 4). As summarized in Figure 2-1, these categories represent increasing levels of effort associated with conducting a compliance assessment for air pollution regulations.

Figure 2-1
Air Compliance Inspection Types

Inspection Level	Scope
Level 1	! Visible emission observations (VEOs) without plant entry ! Upwind/downwind odor assessment ! General observation of operations to check for consistency with permit ! Use as a screening tool for future inspections, and possibly for direct enforcement of opacity requirements ! Potential response to citizen complaints
Level 2	! "Walk through" of the facility ! Limited review of data from on-site monitoring equipment ! Internal checks of air pollution control equipment (if not in service) -- visually from access hatches ! Used to identify potential problems warranting follow-up investigation ! Useful for verifying accuracy/completeness of emission points identified in a permit
Level 3	! Same as Level 2, plus detailed review of available monitoring data for processes/equipment with expected problems ! Use of portable instrumentation to check emission levels/operating conditions ! Comparison of observed data with specified baseline conditions ! Usually narrow in scope and targeted to specific units

Figure 2-1 (cont.)
Air Compliance Inspection Types

Inspection Level	Scope
Level 4	! Used to establish baseline conditions ! For large units, done in conjunction with performance tests ! For small units that are not generally tested, done during periods of documented proper operation ! Also includes development of process/control device flowcharts to aid future inspections

In addition, an important feature of EPA's air inspection guidance is the concept of baseline inspection techniques.[1,2] For many air pollution requirements, a direct compliance comparison during an inspection is impractical. The regulations are often expressed in lb/hr or lb/ton of product, and portable or permanent monitoring equipment generally will not read out directly in these regulatory formats. Instead, shifts from baseline conditions are used to reveal potential compliance concerns. Baseline inspections are based on the principle that control device performance can be evaluated by comparing present operating conditions with specific baseline data. Baseline data are usually generated during a performance test that establishes the ability of the control equipment to achieve compliance with the emission limit. Baseline inspections rely on indications of control device performance as an indirect means of assessing compliance.

Generally, each control device should be approached with the assumption that its operating characteristics and performance levels are unique, given the myriad of site-specific process and control variables that can influence the performance of a particular piece of control technology when applied to a specific emissions source. In addition, evaluations of control performance generally should consider multiple variables because usually no one variable has a dominating effect on overall performance. Therefore, this technique relies on the assessment of shifts in performance of more than one parameter to document the possibility of reduced control performance. In addition, other signs of potential reduced control performance, such as corrosion, solids discharge rate, and fan conditions, can be used to support initial indications of reduced control performance.[1,2] Figure 2-2 identifies several key principles for conducting baseline inspection techniques.

Figure 2-2
Baseline Inspection Concepts[2]

Principle	Rationale
Evaluate changes over time on an individual unit basis	! Numerous site-specific factors vary from unit to unit and impact performance
Evaluate sets of data as opposed to relying on single measurements	! Reduces chance that baseline shifts represent measurements, not emission, problems ! Increases strength of indication that indirect measures of compliance represent actual increases in emissions
Scope should include component failure information and general observations, not just operating data	! Increases in component failure rates or obvious housekeeping problems are important to assess cause of potential compliance problems
The inspector must organize the data and observations effectively and evaluate the basic information while on site	! The inspection should include basic inspection points that definitely are to be covered and follow-up inspection points that are to be covered only if evaluation of basic information indicates a potential problem
Inspectors should be flexible and exercise professional judgement during the assessment	! The baseline concept is designed as a screening test in which more in-depth follow-up is reserved for points at which initial evaluations indicate problems ! Rigid checklists may be incompatible with site conditions, including health and safety concerns

Obviously, a key element of the baseline inspection technique is to have adequate monitoring of process and control performance indicators. The 1985 *Air Compliance Inspection Manual* notes that existing monitoring may be inadequate or insufficiently reliable to perform this function properly. The manual suggests the use of portable analyzers as an additional diagnostic tool to supplement in-place monitors. For most modern pulp mill facilities, the use of DCS provides an effective tool to evaluate process and control performance. To the extent an agency inspector intends to seek access to DCS data, this issue should be discussed at the opening conference to address any confidential business information (CBI) concerns. In addition, the Agency has promulgated the compliance assurance monitoring (CAM) rule at 40 CFR Part 64. The basic concept of the CAM rule is analogous to the baseline inspection technique and, as facilities implement the rule, CAM data will increase the availability and reliability of control device performance monitoring data. In addition, CAM data will have to be reported. These reports can be evaluated prior to the actual on-site assessment activities to prioritize which control equipment within the plant to evaluate during the on-site portion of the assessment. Note that for many mills, CAM data may not be available until the first renewal of a Title V permit, given the implementation schedule in the CAM rule.

In addition to the four basic compliance inspection types, compliance assessment activities under the air program also include specific procedures for conducting compliance tests and for conducting audits of continuous emission monitoring systems (CEMS).

These types of compliance assessment tools are not discussed at length in this manual. For further information, see the 1985 *Air Compliance Inspection Manual*, as well as other EPA guidance related to CEM audits.

2.4 Water Inspections

Under the CWA NPDES program, EPA has developed the *NPDES Compliance Inspection Manual*.[3] As with the manual for the air program, the water manual differentiates between varying degrees of inspections, as shown in Figure 2-3. These various inspection types include a varying mix of records reviews, on-site sampling activities, monitoring audits, and visual (and odor) observations. Unlike the air inspection program, the baseline concept is not a critical component of the water inspection process.

NOTE! The Cluster Rules will require water inspectors to focus on bleach plant, pulping, and chemical recovery operations in addition to traditional focus on wastewater treatment plant operations.

Historically, NPDES compliance inspection procedures have focused generally on wastewater treatment facility operations and discharge characteristics. Often, the wastewater from all processes at a pulp mill will be combined, treated at a single on-site treatment facility, and then discharged from an outfall. The water inspector then can focus the inspection on the wastewater treatment plant operations and evaluate other areas only if problems are discovered and the upstream production processes need to be evaluated to identify the source of the problem. The Cluster Rules add requirements for the bleach plant effluent that will require a water inspector to evaluate bleach plant operations (see Section 6). The Cluster Rules also add best management practices (BMPs) for spent pulping liquor, soap and turpentine that will require the inspector to evaluate operations in the pulping and chemical recovery areas (see Section 4.6 for a discussion of these requirements). Another reason to assess the upstream production processes would be to evaluate compliance with general requirements such as storm water or spill prevention plans (see Sections 8 and 9 for relevant discussions).

Figure 2-3
NPDES Inspection Types

Type	Scope
Compliance Evaluation Inspection (CEI)	! Nonsampling inspection designed to verify compliance ! Records reviews, visual observations, and evaluation of treatment facilities, laboratories, effluents and receiving waters ! Consider data from both biological and chemical self-monitoring

Figure 2-3 (cont.)
NPDES Inspection Types

Type	Scope
Compliance Sampling Inspection (CSI)	! Same elements as CEI ! Obtain representative samples (chemical and bacteriological analyses) ! Verify accuracy of self-monitoring ! Determine compliance with permit limits ! Can be used to determine effluent characteristics and support permit development
Performance Audit Inspection (PAI)	! Used to evaluate self-monitoring program ! Uses CEI records check to verify compliance ! Includes actual observations of permittee's monitoring program from sampling through reporting ! May require permittee to analyze performance samples to assess laboratory's accuracy
Compliance Biomonitoring Inspection	! Same as a CSI, except focus on toxicity bioassay sampling and chronic toxicity testing ! Assess biological effect of effluent on test organisms
Toxics Sampling Inspection (TSI)	! Same as a CSI, except focus on toxic effluent parameters (other than heavy metals, phenols, and cyanide generally analyzed during a CSI)
Diagnostic Inspection (DI)	! Troubleshooting inspection to assist POTWs that are not able to achieve permit compliance
Reconnaissance Inspection (RI)	! Used to obtain preliminary overview ! Quick visual inspection as a screening tool to identify potential problems
Pretreatment Compliance Inspection (PCI)	! Evaluation of municipal authority's pretreatment program ! Record reviews of industrial user activities (monitoring, inspections, and enforcement) ! May be supplemented with inspection of industrial users
Legal Support Inspection (LSI)	! Resource intensive inspection ! Designed to support specific enforcement action

2.5 Hazardous Waste Inspections

Under RCRA, EPA has developed the *RCRA Inspection Manual*.[4] There are many types of RCRA inspections, as shown in Figure 2-4. However, the compliance evaluation inspection (CEI) is the primary mechanism for assessing RCRA compliance by hazardous waste generators, transporters, and TSD facilities. The types of RCRA inspections differ based upon the purpose, facility status, and probable use of inspection results.

Figure 2-4
RCRA Inspection Types

Type of Inspection	Description
Compliance Evaluation Inspection (CEI)	! Routine inspection of hazardous waste generators, transporters, and TSDFs ! Encompasses file review prior to the site visit, on-site examination of generation, treatment, storage or disposal areas, and a review of records ! May include inspections of facilities with delisted waste (not typical to pulp mills) ! If corrective action involved, this includes assessment of compliance with consent and permit orders
Case Development Inspection (CDI)	! Conducted when RCRA violations are suspected or revealed during a CEI ! Specific purpose is to gather data in support of an enforcement action
Comprehensive Ground-Water Monitoring Evaluation (CME)	! Conducted to ensure that groundwater monitoring systems are designed and functioning properly at RCRA land disposal facilities (not typical to pulp mills) ! Includes activities, plus sampling and analysis of groundwater monitoring system and hydrogeological conditions
Compliance Sampling Inspection (CSI)	! Focus is on collecting samples for laboratory analysis ! May be conducted in conjunction with a CEI or any other type of inspection, except a CDI
Operation and Maintenance Inspection (O&M)	! Conducted at closed land disposal facilities (not typical to pulp mills) to determine the adequacy of the operation and maintenance of groundwater monitoring systems ! Usually conducted at facilities that have already received a thorough evaluation of the groundwater monitoring system under a CME inspection
Laboratory Audit	! Inspection of laboratories performing sample analyses ! Ensures that laboratories are using proper sample handling and analysis protocols
State Oversight Inspection	! Conducted by U.S. EPA personnel to determine the effectiveness of State hazardous waste management programs and to determine facility compliance

Pulp and paper facilities generally will be subject to RCRA requirements as a generator of hazardous waste, not as a TSD facility. Particular mills may have on-site remediation or other corrective action activities subject to RCRA requirements, but those activities are outside the scope of this manual. To the extent underground storage tanks (USTs) are present, UST requirements under RCRA will apply. Consistent with the *RCRA Inspection Manual*, waste sampling generally will not be part of a standard agency inspection of a hazardous waste generator or for UST assessment purposes. Industry self-assessments may be more likely to include waste sampling activities to verify the status of various waste streams. The two primary inspection tools covered in this manual for RCRA purposes are record reviews (e.g., reviewing waste manifests or personnel training records) and visual inspection of waste storage areas.

2.6 Multi-media Inspections

The EPA's National Enforcement Investigations Center (NEIC) published a *Multimedia Investigation Manual* in March 1992.[5] Although the manual is no longer considered a reference for current agency procedures and standards, much of the information in the manual is still applicable.

The NEIC manual specifies four categories of inspections, with increasing complexity and multimedia aspects:

- **Category A:** Program-specific compliance inspections that are conducted to determine compliance status for program-specific regulations.

- **Category B:** Program-specific compliance inspections in which the inspector(s) screens for and reports on obvious, key indicators of possible non-compliance in other environmental program areas.

- **Category C:** Several concurrent and coordinated program-specific compliance investigations conducted by a team of investigators from two or more program offices. The team conducts a detailed compliance evaluation for each target program area.

- **Category D:** Resource-intensive, comprehensive facility evaluations that address compliance in targeted program-specific regulations and attempt to identify environmental problems that might otherwise be overlooked. Identify waste streams by process and trace to final disposition. Requires a team of inspectors who have been thoroughly cross-trained in different program areas.

The NEIC manual identifies several benefits to conducting Category C or D multi-media inspection. These benefits include:

- More comprehensive and reliable compliance assessment
- Higher probability of uncovering/preventing problems before they occur or before they create an environmental/public health risk
- Improved ability to respond to non-program specific complaints or issues and to understand cross-media problems
- Improved enforcement

This kraft pulp mill compliance assessment manual is designed to support any assessment from Category A through Category D. This manual does not, however, focus on Category D inspections. Instead, the manual is organized generally by program type within each process area of the kraft pulp mill. This organization is consistent with preparing for a Category A, B or C assessment. In addition, because of the relatively limited nature of RCRA waste and EPCRA issues at most kraft pulp mills, the manual focuses on specific ideas for screening analyses (Category B) to assess compliance with RCRA and EPCRA issues.

2.7 Summary

Inspections under the three media programs will have several elements in common. First, both pre-inspection and on-site inspection activities in all three programs should include a review of facility records, including the permit (not applicable to hazardous waste), required monitoring data submissions, incident reports such as malfunction/upset reports, and previous inspection/enforcement records. In addition, records required to be maintained on site but not submitted to an agency (such as waste manifests, equipment maintenance records, monitor quality assurance activities, etc.) can be reviewed during the on-site inspection for all three media programs.

Visual and odor observations of facility operations will be a critical component of an inspection for any of the media. Visual and odor observations can be used to provide a quick indication of obvious potential problems or poor housekeeping practices. Based on the observations, the inspector can prioritize which elements of the process deserve more detailed attention within the time available. In addition, visual observations can be used as a direct determination of compliance in many contexts. For instance, under the air program, visible emission observations (VEOs) using Method 9 in Appendix A of 40 CFR Part 60 is a method for determining compliance with opacity regulations. Compliance with some work practice standards can also be assessed visually. For water, visual observation can be used to assess compliance with certain effluent limitations, such as prohibitions against excessive sheen. Under RCRA, numerous requirements can be assessed visually because many of the standards are specific work practice standards. Examples include appropriate labeling practices and aisle space between containers.

At this point, the appropriate assessment techniques for the various media will begin to diverge. For waste inspections, no further assessment generally will be conducted unless particular circumstances require sampling of specific wastes. For water, the next level of assessment is likely to involve actual sampling activities aimed at developing a direct determination of compliance with effluent limits and as a check on the source's compliance monitoring program. For air, the next step toward a more in-depth analysis involves evaluating baseline parameters to detect potential decreases in control performance without having to conduct actual direct compliance determinations using specified compliance test methods. Because of the diffuse nature of air pollutant emission points, the compliance assessment for air also is likely to cover more separate process units than an assessment related to water effluents.

References:

1. *Air Compliance Inspection Manual* (EPA-340/1-85-020), U.S. Environmental Protection Agency, September 1985.

2. Richards, J., *Baseline Inspection Techniques*, Student Manual, Air Pollution Training Institute Course 445, 2nd edition, 1996.

3. *NPDES Compliance Inspection Manual* (EPA-300-B-94-014), U.S. Environmental Protection Agency, September 1994.

4. *Revised RCRA Inspection Manual* (OSWER Directive 9938.02b), U.S. Environmental Protection Agency, October 1993.

5. *Multi-media Investigation Manual* (EPA-330/9-89-003-R), U.S. Environmental Protection Agency, Rev. March 1992.

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SECTION 3: GENERAL INSPECTION STEPS

The basic steps to conducting a successful compliance inspection are generally similar across the various media. Each assessment requires (1) upfront planning, (2) accurate recording and documentation of findings, and (3) effective follow-up action to problems discovered during the inspection.

3.1 Planning the Inspection

Without successful planning before the inspection, compliance assessment is unlikely to provide complete and accurate results. In addition, agency inspectors usually will have only a relatively brief time to conduct on-site assessments for individual facilities. Proper preparation is therefore essential to maximize the benefits of conducting the assessment. Recommended steps include:

Define objectives. In order to plan the appropriate scope of an assessment, the inspector first must define the objectives. Often, the basic objective of an assessment will be to evaluate general compliance with regulatory requirements. In some cases, however, more specific objectives may play a role, including:

- Verifying accuracy/completeness of a permit
- Responding to citizen complaints
- Identifying the root cause of a discovered problem and/or evaluating effectiveness of corrective actions taken
- Developing information to support/respond to enforcement action
- Observing required sampling/testing
- Auditing of compliance monitoring systems

This manual will focus primarily on basic compliance assessments (including response to citizen complaints), permit verifications, and root cause assessments.

Identify assessment team/critical participants. Assembling the appropriate team of individuals that will be involved in the assessment will be critical to its overall success. It is important to identify not only the direct participants but also the critical process operators and other staff that may be needed to answer questions and assist with immediate follow-up issues. For instance, if a review of continuous emission monitoring system (CEMS) data is planned as a component of the assessment, coordinating in advance to make sure that the key CEMS operators are available for questions on monitor maintenance/downtime activities will be important.

At this stage, the agency inspector should also coordinate with other offices and the facility to the extent appropriate. For agency inspections, a key issue to resolve at the outset is whether the inspection will be an announced or unannounced inspection. Often, an agency will want to conduct an unannounced inspection to obtain as realistic a view as possible of source operating practices. If the inspection will be announced, the agency inspector should coordinate with plant personnel to ensure that the appropriate staff are available, that the schedule does not conflict with planned activities at the facility that could interfere with the inspection, and that the inspector satisfies any special safety requirements established by the facility. Examples of coordination activities include:

Figure 3-1
Pre-Assessment Coordination

Potential Coordination Activities
! Scheduling joint inspections with other agencies/offices ! Scheduling inspections to avoid conflicts with planned activities of other agencies/offices or the facility ! Conferring with other agencies/offices on their information needs if multi-media screening planned ! Obtaining relevant information on the facility and its compliance status ! Discussing permit-related issues with the appropriate permit writer ! Identifying all necessary safety and inspection equipment

Develop background information. Before conducting the on-site assessment, the inspector should review existing information that describes the plant, processes, and previous compliance assessments. At a minimum, existing permits, applicable regulations, recent monitoring reports, and the most recent inspection report should all be evaluated for matters within the scope of the assessment. If recent enforcement actions have occurred at a facility, the relevant enforcement documents, especially any compliance plans or corrective action obligations, should be reviewed so that compliance is assessed with those obligations that may apply above and beyond the basic permit requirements. Agency air or water inspectors that may be considering multi-media screening efforts for waste or toxic release reporting issues may want to review available information from agency databases.

It is important to note that self-monitoring and self-certification data are increasingly required and available under federal regulations. This availability increases the need to review available data thoroughly and to integrate that information into deciding which facilities and processes within a facility to evaluate. The following Figure 3-2 provides a list of various records and information sources that should be reviewed prior to conducting the assessment.

Figure 3-2
Pre-Assessment Records Review

Information Needs	Information Sources
Basic Facility Information ! Plant name, location, ID#s ! Contact information (name, title, phone/fax#) ! Flow diagrams/general schematics of production processes, and associated control/waste handling equipment ! Production rate data ! Safety equipment requirements	! Prior inspection reports ! Permit files ! Contact with facility
Regulatory Information ! Permits required ! Standards applicable ! Required reports	! Regulations ! Permits
Compliance Status/History	! Enforcement files ! Prior inspection reports ! Computer databases (IDEA, AIRS, PCS, RCRIS)
Emissions Data	! MSDS Sheets ! TRI reports ! DMRs ! TRS, opacity, other CEMS ! Material balance calculations ! Engineering calculations used to prepare TRI reports
Control Method Data ! Description/design data for control equipment ! Upsets/malfunctions	! Permit files ! Prior inspection reports ! Baseline test results ! Malfunction/upset/bypass reports ! Reported control device parameter data

Prepare inspection plan/strategy. To assure that the objectives of the assessment are achieved, the inspector should develop a specific plan for conducting the on-site assessment. The plan should include the objectives, a list of specific tasks to be performed, the procedures to use to complete the tasks, a list of required resources, and the schedule. The plan should include priorities, and should address shifts in tasks and schedule that may be necessary if initial screening evaluations indicate the need for detailed follow-up. For instance, if a screening check of certain operating parameters documents a shift from baseline expected conditions that could lead to emission increases, following up on that information may take precedence over assessing another process. Figure 3-3 lists key elements of an inspection plan.

Figure 3-3
Inspection Plan

Issues to Cover	Potential Components
Objectives	! General compliance assessment ! Root cause evaluation ! Permit preparation/verification
Scope	! Full facility ! Targeted processes
Tasks	! Visual observation ! Record reviews ! Sampling/measurements ! Interviews with plant operators
Procedures	! Identification of which records to look at and timeframe ! Link issues raised in records reviewed prior to inspection to items to be investigated on site ! Checklists to use ! Measurement procedures, including chain-of-custody considerations ! Identify what follow-up procedures may be needed
Resources	! Identify necessary equipment ! Identify what background information needed during assessment (e.g., baseline data for comparison purposes)
Schedule	! Allocation of time per task, with potential adjustments if follow-up procedures needed for particular tasks

Equipment/resource preparation. The final key aspect of planning the assessment is to identity what equipment and resources to bring to the assessment. Safety equipment is of paramount concern. In addition, inspection equipment, including sampling or measurement equipment, should be identified. Finally, it is important to bring information collected during the background review phase that may need to be verified or compared against during the inspection.

3.2 Conducting the Inspection

Once these initial preparation activities are completed, the actual assessment can be conducted. The remainder of this document focuses primarily on this phase of the assessment process, although the manual also identifies, where applicable, critical monitoring and similar information that should be evaluated prior to or after the on-site phase to supplement on-site findings. The following discussion highlights key procedural steps for conducting the on-site phase of the assessment.

Opening conference/meeting. For agency inspections, the opening conference serves an important function, especially in the case of an unannounced inspection. At this point, the agency staff should identify the purpose of the inspection, the legal authority, and the procedures to be followed. The conference also presents the opportunity to provide general compliance assistance and answer relevant questions. Effective communication at this stage will facilitate the subsequent stages of the inspection. A list of appropriate topics to cover in the opening conference includes:

Figure 3-4
Opening Conference Topics

Topic	Purpose
Outline Objectives	! Inform facility of purpose and scope ! Avoid misunderstandings
Discuss Agenda/Schedule	! Streamline subsequent activities ! Identify possible conflicts ! Allow for scheduling meetings with facility personnel
Verify Facility Information ! Basic data (correct names, etc.) ! Production data ! Emission sources	! Update existing facility information ! Identify possible changes that create new compliance issues
Provide List of Records to be Reviewed	! Streamline subsequent activities ! Provide source opportunity to collect information during initial phase of on-site assessment ! Identify confidential business information (CBI)
Arrange for Accompaniment	! Identify safety constraints ! Identify CBI ! Explain operations/answer questions ! Arrange for discussions/questions with plant operational staff
Photographs/Videos	! Notify plant personnel of intent to take photographs or videos to document observed conditions
Schedule Closing Conference	! Provide opportunity for follow-up questions ! Confirm confidentiality claims
Duplicate Sampling/ Measurement	! Advise facility of right to obtain duplicate samples or to conduct simultaneous measurements
Confidentiality	! Advise facility of right to request that documents be handled as CBI
Compliance Assistance	! Respond to inquiries about new/proposed regulations

The opening conference provides an excellent opportunity, along with the closing conference, for an agency inspector to provide compliance assistance to facility representatives. For instance, the inspector can provide information about new or proposed regulations that could affect the facility. The agency inspector, however, should not attempt to provide interpretations of the finer points of regulatory requirements, provide unwritten policy interpretations or provide detailed design information on a facility's particular problem. The EPA has recently prepared a report[1] on this issue that identifies three tiers of compliance assistance activities, shown in Figure 3-5. Generally, Tier I represents appropriate activities for inspection personnel, while Tier III represents generally inappropriate activities. Tier II activities should be approached cautiously and may be more appropriate for separate agency personnel or as part of a separate site visit.

Figure 3-5
Compliance Assistance Activities

Tier I (Appropriate Assistance): Sharing Standardized Information and References	Tier II (Potentially Appropriate Assistance): More Technically Complex and Site-Specific	Tier III (Generally Inappropriate Assistance): Most Technically Complex and Site-Specific
! Providing physical copies of requirements ! Conveying an understanding of requirements ! Providing information including prepared guidance, manuals, and technology transfer documents ! Providing information on what assistance can be gained from EPA, State, and local programs ! Providing information on what assistance can be gained from trade and other (i.e. public) organizations ! Sharing information on control practices and equipment used within a specific sector to comply with environmental regulations ! Providing published technical information and/or advice for simple solutions that do not require a significant amount of resources or liability to the source/facility or regulatory agency ! Providing prepared literature on pollution prevention techniques and opportunities ! Providing suggestions on simple techniques and concepts to reduce or eliminate pollution (e.g., housekeeping tips)	! Sharing information on compliance status ! Providing review of compliance status ! Sharing information and insight into their particular problem and what might be evaluated to remedy the problem ! Providing technical assistance on recognized industry or sector-based practices and concepts to reduce or eliminate pollution (e.g., chemical substitution, equipment changes)	! Providing information on specific commercial consultant services ! Providing interpretations of the finer points of regulatory requirements ! Providing detailed design information on a source/facility's particular problem ! Providing unwritten policy interpretations on regulatory requirements ! Providing detailed facility-specific engineering design and materials management information that advances pollution prevention

Recording assessment findings. Complete and accurate recordation of findings is critical to the success of any compliance assessment activity. From an agency inspector's viewpoint, maintaining complete and accurate information is essential as the information may be used subsequently in an enforcement, permitting or similar context. Even if potential enforcement concerns are not present, full documentation will be important so that subsequent assessments build upon prior activities. Examples of documentation that may be produced during the assessment include:

Figure 3-6
Documentation of Findings

Document Type	Purpose and Contents
Field Notebook/Notes	! Most critical component ! Include all observations made, list/reference all procedures used, note unusual conditions, reference all documents/photographs reviewed, copied or produced
Forms and Checklists	! Concise uniform method of collecting information ! May serve as template for entering data into tracking system (e.g., use of standard NPDES Inspection Form for entering data into PCS)
Sampling/Measurement Documentation	! Chain of custody procedures must be followed and documented to use samples/measurements as evidence
Drawings and Maps	! Useful for cross-referencing in notes, checklists, etc.
Records Reviewed	! Copies may be necessary to document potential problems discovered or to verify compliance status ! Copies should be numbered and initialed, with appropriate referencing in field notes, to allow for substantiating authenticity at later date
Photographs	! Provide objective record of observed conditions ! Because of proprietary/confidentiality concerns, the use of photographs to document findings should be discussed with facility personnel ! Duplicates should be offered to facility personnel ! Log photographs/video segments in field notebook. After film is developed, mark all photographs to allow for proper identification at a later date. Make sure you can identify from each photo or inspection report the film type, lens type, shutter speed, lighting, time of day, weather conditions, date and location, and description of subject

The issue of confidential business information (CBI) is likely to arise during an inspection. The facility is responsible for making a claim of confidentiality. However, a claim of confidentiality is not grounds to refuse access to the information by an agency inspector -- rather, it safeguards the release of the CBI by the inspector to the public at large. The EPA has developed specific regulatory procedures for handling claims of confidentiality (see 40 CFR part 2). The inspector must assure that the facility is given the opportunity to make the claim and that the inspector clearly acknowledges any information received by the inspector which the facility claims is protected as CBI.

In addition, the inspector must follow all prescribed chain of custody procedures for any samples collected during an inspection. See the discussion of this topic in the media-specific inspection manuals for the air, water and hazardous waste programs.

Closing conference. The closing conference allows the assessment team and facility staff to wrap up remaining issues following the data collection stage. The main components of the closing conference include:

- **Review findings.** Allows for filling in gaps, clarifying ambiguous findings, and resolving technical disagreements over what was found

- **Answer questions.** Provides a chance for factual questions. Legal conclusions, opinions about compliance status, and enforcement consequences should be avoided, except for circumstances where the inspector exercises field citation authority

- **Confidentiality claims.** A final opportunity to claim CBI protection for information collected during the inspection

3.3 Inspection Follow-up

The appropriate follow-up to an inspection clearly will vary depending on: (1) who is conducting the inspection and (2) what is found during the inspection. However, two fundamental aspects will be appropriate in nearly all circumstances:

- Develop a concise, clear report of what was found
- Communicate effectively what was found so that, if necessary, further action may be taken

The critical elements of a successful report, for either an agency or industry inspection, are to address the following issues:

- Why the inspection was performed
- What was covered
- What was found
- What issues should be followed up on and when
- What are the priorities for any further assessments

For an agency inspection report, the findings may eventually be used as part of an enforcement action. Therefore, it is essential that inspection reports are well-written and document all key facts. Appropriate references to documentary support collected during the inspection must be included. If CBI is included in the report, the material should be referenced in a manner that preserves confidentiality (for instance, refer to a document control number assigned by the agency and provide a general description of the information). If the confidential information is referred to directly, then the entire report must be treated as confidential. The inspector should refer to the media-specific inspection manuals for further discussion of these CBI concerns, as well as further suggestions on the style and format of an inspection report.

For a self-assessment inspection, the report should address many of the same factual items as would be included in an agency inspector's report. However, a self-assessment may be more likely to identify the root cause of any problems discovered and what specific corrective actions will be taken to address the problems. The ability of facility personnel to provide an explanation of the cause of any problem and the corrective actions taken may help avert enforcement action by the regulatory agency. The facility should document all corrective actions taken. The facility also should consider prompt disclosure of any problems discovered and the actions taken to correct the problems. The EPA has established a policy that substantially reduces or eliminates civil penalties for violations that are addressed in this manner. (See 60 FR 66706, December 22, 1995)

References:

1. *Role of the EPA Inspector in Providing Compliance Assistance*, Final Report, U.S. Environmental Protection Agency, July 1, 1997.

SECTION 4: ASSESSMENT MODULE FOR KRAFT PULPING OPERATIONS

4.1 Introduction

CONTENTS

In the past, the pulping process area was less likely to be a priority area for many compliance evaluations. However, as a result of the Cluster Rules, the pulping process area is subject to significant new regulatory requirements for both air emissions and water discharges. Therefore, this area will be a critical process for compliance evaluation as the Cluster Rules are implemented.

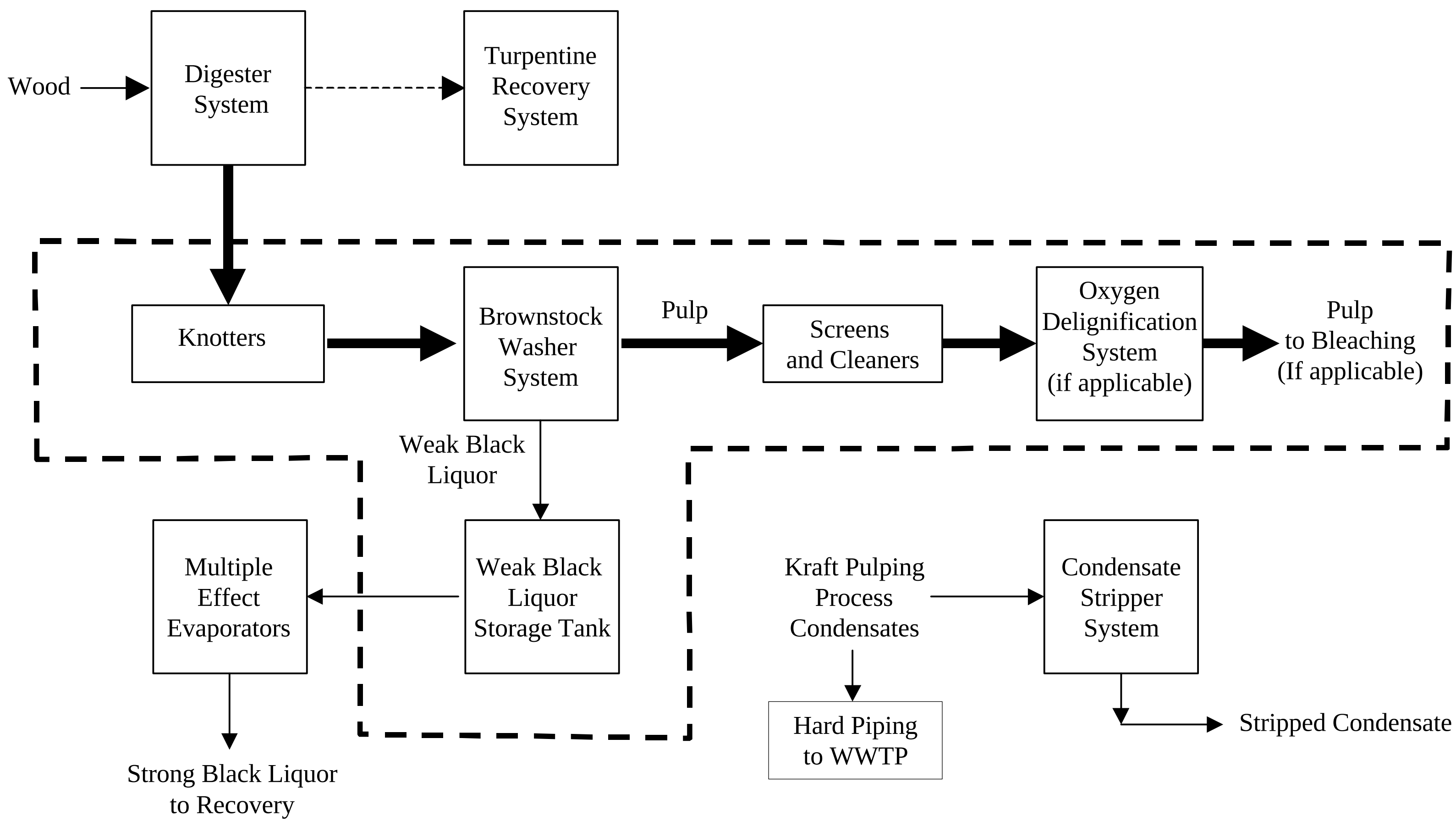
To address these compliance assessment issues, this section provides a thorough overview of the applicable processes, regulatory requirements, and inspection procedures. After a short description of the pulping process as a whole, this section breaks down the pulping processes into four main activities of regulatory concern: low volume, high concentration (LVHC) gas collection; high volume, low concentration (HVLC) gas collection; condensates; and spent pulping liquor, turpentine and soap management. In addition, Appendix E contains an example assessment form specifically designed to address the issues raised in this process area.

4.2 Overview of Process and Discharges

4.2.1 Description of the Process

The pulping process converts raw materials (e.g., wood, plants) into fibers that can be formed into paper or paperboard. There are three main functions performed by the pulping department: producing pulp (digestion), pulp processing to remove impurities from the pulp and recover spent cooking chemicals, and weak black liquor processing to concentrate spent liquor for chemical recovery. Figure 4-1 depicts a typical sequence of the major equipment systems in the pulping process. The function of each of these systems is described below.

Figure 4-1
Flow Diagram of Typical Kraft Pulping Systems



Equipment enclosed by the dashed line are part of the HVLC system. The remaining equipment are components of the LVHC system.

The digesting process. Kraft pulping entails cooking, or digesting wood chips at elevated temperature and pressure with an alkaline pulping liquor that contains sodium sulfide (Na_2S) and sodium hydroxide (NaOH). Cooking may be performed in either batch digester systems or continuous digester systems. For mills that use softwood feedstock, the digester system generally will also include a turpentine recovery system. The turpentine is recovered from digester relief vent gases.

Pulp processing steps. The raw pulp is cleaned of impurities prior to bleaching (if performed) or papermaking. The primary cleaning operations include deknotting, brown stock washing, and pulp screening and cleaning.

> *Deknotting* removes knots and other portions of uncooked wood from the pulp slurry. The knots and uncooked wood are either burned for energy recovery, disposed of as waste, or recycled for repulping.
>
> *Brown stock washers* recover spent cooking liquor (weak black liquor) for re-use in the pulping process. Weak black liquor consists of dissolved wood compounds and cooking chemicals. Efficient washing is critical to maximize return of spent cooking liquor to chemical recovery and to minimize carryover of spent cooking liquor (known as brown stock washing loss) into the bleach plant. Excess spent cooking liquor carried over in the pulp increases consumption of bleaching chemicals and can lead to high pollutant loads in wastewater treatment. A variety of brown stock washing technologies are used; the most common technology is a series of two to four rotary vacuum washers. In each washer, wash water is applied to displace spent cooking liquor in the pulp; countercurrent washing is generally used to reduce fresh water requirements. Other common washer types are diffusion washers, rotary pressure washers, horizontal belt filters, wash presses, and dilution/extraction washers.
>
> *Pulp screening* removes the remaining oversized particles from washed pulp. The pulp is diluted to low percent solids and passed through a perforated screen and rejects are removed from the screen continuously. Methods for removing rejects are shaking and vibration, hydraulic sweeping action, back-flushing, or pulsing the flow through the openings with various moving foils, paddles, and bumps.[1] Mills may operate open, partially closed, or closed screen rooms. In open screen rooms, wastewater from the screening process is discharged to wastewater treatment. In closed screen rooms, wastewater is reused in brown stock washing or other pulping operations and ultimately enters the chemical recovery system. Typically, a decker is used to thicken the pulp for storage after screening.
>
> *Pulp cleaning* in centrifugal cleaners is used to remove high specific gravity contaminants such as dirt and sand from the screened pulp. Centrifugal cleaners, also known as liquid cyclone, hydro cyclone, or centricleaners, consist of a conical or cylindrical-conical pressure vessel with a tangential inlet at the largest diameter of the cone. Centrifugal force and fluid sheer generated from fluid rotation cause

the more dense contaminants to concentrate at the narrow end of the cone where they are removed. Cleaners are typically employed in a cascade of three or more units, with the rejects stream directed to subsequent cleaners to concentrate the dirt in the reject stream and return good fiber to the process.

Weak black liquor processing. Weak black liquor collected from the pulp washers will usually go into a weak black liquor (WBL) storage tank. The WBL is sent to the multiple effect evaporator (MEE) to evaporate water and concentrate the WBL in order to increase solids content. Typically, weak black liquor from the brown stock washers contains 13 to 17% solids.[2] The WBL is then concentrated to 60 to 80% solids, which is required for efficient combustion in the recovery boiler. A MEE will include four to seven effects, or bodies, arranged in series.[4] At pulp mills using pine wood, a tall oil recovery system is generally incorporated into the evaporator system to recover tall oil or "soap" from the black liquor.

Condensate stripping. The pulping process system may also include a condensate stripper system to remove organics and total reduced sulfur (TRS) compounds from various pulping process condensates. These condensates are wastewater streams produced from condensed gases from digester systems, turpentine recovery systems, and evaporator systems. Generally, the streams that are stripped are the turpentine decanter underflow, blow steam condensates, and evaporator condensates. The stripped condensates may then be used as hot process water and the off gases are typically combusted.

Gas collection systems. Vent gas collection systems, or non-condensible gas (NCG) systems, are used to collect gases from the various pulping processes and transport them to an appropriate incineration device for air pollution control purposes. For safety purposes, the NCGs are segregated into two categories[5]: low volume, high concentration (LVHC) and high volume, low concentration (HVLC). A number of mills will use a dedicated incinerator to control these emissions, but most often the facility will use process combustion sources such as the lime kiln, power boilers or recovery boiler. Historically, most LVHC gases have been controlled, while a smaller portion of the HVLC gases have been controlled.[3]

Oxygen delignification. Some mills may also have an oxygen delignification stage either in the pulping area or as a prebleaching stage. At present, oxygen delignification is used at only a relatively small number of mills, but is expected to become more widely used over time. High efficiency oxygen delignification minimizes the amount of bleaching chemicals needed to achieve adequate pulp brightness. There are currently two types of oxygen delignification systems available: high consistency and medium consistency.[4] Medium consistency systems are more popular due to safer operation and lower capital costs. Design and placement of these systems vary from mill to mill. Two-stage oxygen delignification systems are becoming more widely used in the United States.

4.2.2 Air Pollutant Emissions

NOTE! MACT summaries in this Section 4 are based on 4/15/98 Final Rule and subsequent regulatory notices published through 4/30/99. Check website for possible updates to this section that will reflect any subsequent regulatory notices.

As discussed above, air emissions from the above process equipment systems generally fall into two categories: low volume high concentration (LVHC) noncondensible gas (NCG) streams, and high volume low concentration (HVLC) NCG streams. Critical characteristics of these emissions are:

- The primary air pollutants of interest are TRS and organic HAPs, primarily methanol. Typical emission rates for various equipment systems are shown in Figure 4-2.

- TRS emissions may be subject to NSPS and/or State standards, and HAP emissions are subject to MACT requirements under the Cluster Rules.

- LVHC emissions in the past have generally been subject to greater control than HVLC emissions, and HVLC emission points are generally more likely to be unenclosed than LVHC points.

- For safety reasons, the LVHC and HVLC gas streams also generally use different gas collection systems and are often sent to separate combustion units for control.

Because of their different regulatory treatment, Sections 4.3 and 4.4 treat these two gas streams separately.

In addition, Section 4.5 contains a separate discussion of HAP air emission concerns for pulping condensates. The Cluster Rules include requirements to control air emissions from the liquid pulping process condensates in addition to LVHC system-based requirements for condensate stripper system overhead gases. Section 4.5 addresses these new regulatory provisions.

Figure 4-2
Typical Air Emissions from the Pulping Processes at a 1000 Ton Per Day Kraft Mill[a]

Pulping System Components (Type of NCG)	Typical Emissions (Tons/yr)		
	Methanol	Total HAP	TRS
Digester and Evaporator[b] (LVHC)	0.5	2.3	5.1
Knotter[c] (HVLC)	2.6	2.9	Not Available
Screen[d] (HVLC)	1.4	1.5	Not Available
Brown Stock Washer (HVLC)[e]	210.0	249.0	73.5
Decker (HVLC)	12.1	21.7	Not Available
Oxygen Delignification (HVLC)	210.0	244.5	Not Available
Pulp Storage (HVLC)	7.0	18.0	Not Available
Weak Black Liquor Storage (HVLC)	12.1	12.9	Not Available
Steam Stripper Overhead Gases[b]	0.4	0.4	1.9
Miscellaneous Sources[f]	Not Available		87.5

a Based on average AP-42 Emission Factors (TRS), Air Pollution Engineering Manual[9] (steam stripper gases TRS value) and 1997 EPA Chemical Pulping Emission Factor Development Document[13] (Methanol and Total HAP), with 350 operating days/year.
b Assumes controlled system (99% control efficiency). Digester system includes an assumed turpentine condenser. All other points assume no control device is used.
c Assumes pressure/open type configuration.
d Assumes closed screens.
e Assumes open rotary vacuum drum washer, using average of data from system with high and low HAP concentration in recycled water.
f AP-42 identifies miscellaneous sources as "knotter vents, brownstock seal tanks, etc." Thus, includes TRS emissions from smaller equipment systems in pulping area, likely including many of the individual systems the table identifies as "Not Available" for TRS data.

4.2.3 Water Pollutant Discharges

Most of the equipment systems in the pulping process area have some associated wastewater either in the form of foul condensates, black liquor spills or other discharges. With proper management practices -- with the exception of condensates and a reject purge from screening and cleaning -- planned discharges from the pulping area can be eliminated.

The high HAP/TRS concentration (or foul) condensates generally are steam stripped prior to being sewered to wastewater treatment. The applicable effluent limitations and other requirements apply at the wastewater treatment plant -- after these pulping condensates are combined with other process wastewaters. Thus, no CWA effluent limitations guidelines or standards will apply specifically to these condensates.

However, best management practices (BMPs) promulgated as part of the Cluster Rules do apply. These BMPs require certain practices for control of leaks, spills and intentional diversions of spent black liquor, turpentine and soap, and are discussed in more detail in Section 4.6.

4.2.4 Solid/Hazardous Waste Releases

The pulping process generally does not generate significant RCRA-related hazardous waste streams. However, handling of spent black liquor can create RCRA-related concerns. Black liquor is not a listed RCRA waste and is excluded from regulation as a solid waste under 40 CFR 261.4(a)(6) if the black liquor is reclaimed in a recovery furnace and reused in the pulping process. Therefore, potential liquor spills that are not reused in the process -- such as leaks from surface impoundments used to store black liquor prior to recovery -- may be an issue for RCRA compliance assessment if the spilled liquor exhibits one of the four hazardous waste characteristics (toxicity, corrosiveness, reactivity, or ignitability). The RCRA regulatory and inspection procedures are discussed in Section 4.6, which covers spent liquor management.

To the extent other hazardous waste is generated in the pulping area, those issues are addressed in Appendix C through the general discussion of RCRA regulatory and inspection procedures for generators of hazardous waste.

4.2.5 EPCRA Chemicals and Reportable Releases

Facilities will have to provide information on chemicals used in the pulping process area to meet EPCRA's emergency preparedness requirements. Appendix D contains a process-based list of the types of hazardous chemicals that typically could be included in an EPCRA inventory for a kraft pulp mill.

On-site air, water and land releases, including land disposals, of toxic chemicals associated with pulping processes, as well as off-site waste transfers of these toxic chemicals, may have to be accounted for in TRI Form R reports. These Form R reporting requirements apply to each of Sections 4.3 through 4.6 and are discussed briefly in each section.

In addition, EPCRA/CERCLA emergency release reporting could apply to off-site releases that are not federally permitted. These releases potentially could include abnormal air emissions or spills of black liquor or turpentine released off-site. These reporting issues also are discussed briefly in Sections 4.3 through 4.6.

4.3 LVHC Gas Collection System

As discussed above, LVHC gas collection is a critical element of controlling air emissions from the pulping process area. These air emissions are subject to significant CAA and State regulation, including new Cluster Rules requirements, and may also raise EPCRA reporting obligations as well. This section describes the:

- Emission points involved, including the nature and amounts of their emissions
- Air regulations that apply and air compliance inspection procedures
- EPCRA reporting obligations and EPCRA inspection procedures

Key Features for LVHC Gas Collection

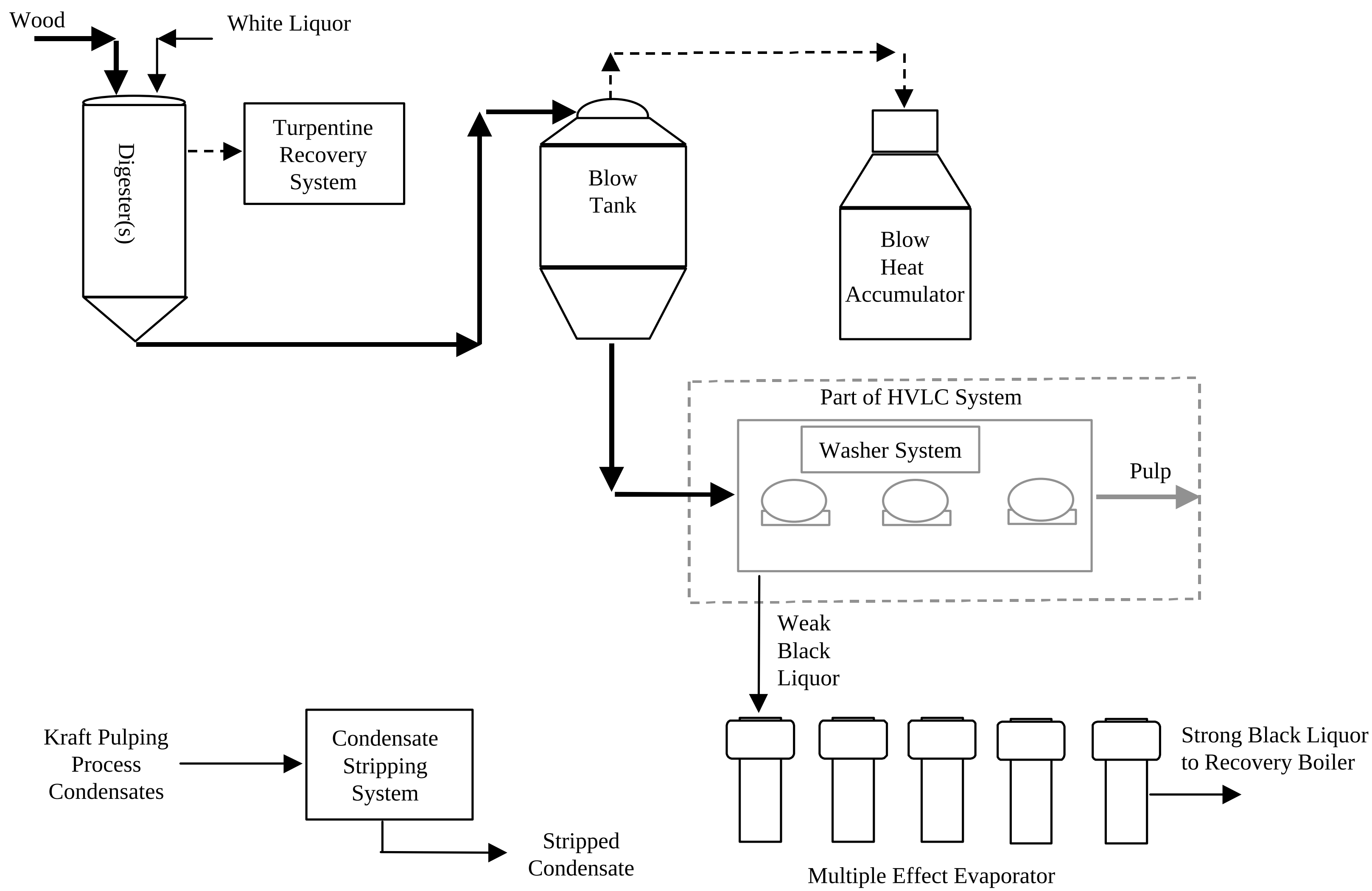
- **TRS (NSPS and State) and HAP (Cluster Rules) requirements may apply**
- **Thermal incineration nearly exclusive control option used**
- **Combustion units in other areas of the mill often used to control emissions**
- **Cluster Rules add recordkeeping for collection system inspections and uncontrolled venting**
- **EPCRA obligations include TRI Form R and the potential for emergency reporting for abnormal air releases**

4.3.1 LVHC Emission Points

The primary LVHC emission points are the digester system (including associated flash and blow tanks, chip steamer(s), and condensers), turpentine recovery system, multiple effect evaporators (including associated hotwells and condensers), and condensate steam stripping system. These points are identified in Figure 4-3. The primary emissions of concern are total reduced sulfur (TRS) compounds and organic HAPs, primarily methanol.

These points generally are addressed consistently under the applicable regulations (NSPS and State regulations for TRS, and Cluster Rules MACT requirement for HAPs). However, the NSPS (and comparable State regulations) do not apply to emission points associated with the turpentine recovery system except the condenser prior to the turpentine decanter. In contrast, the Cluster Rules apply to all emission points associated with the turpentine recovery system (other than turpentine storage tanks following the decanting process). As a result, emissions associated with the turpentine decanter are covered only under the Cluster Rules, not the NSPS.

Figure 4-3
Flow Diagram of LVHC System



4.3.2 LVHC Air Regulations

4.3.2.1 TRS Requirements

Basic emission limits. Prior to the Cluster Rules, TRS was the only compound generally regulated from these LVHC points. The New Source Performance Standards (NSPS) for kraft mills (40 CFR part 60, subpart BB) apply to new or modified (post 9/24/76) pulping process equipment systems with LVHC emission points. Although the NSPS do not require any particular control technology, incineration is used almost exclusively to meet the NSPS limits. Some mills will use stand-alone incinerators, but most mills will take advantage of process combustion sources to incinerate LVHC gases. A lime kiln is the predominant combustion source used for this purpose, although a significant number of mills use on-site power boilers, and a few mills use a recovery boiler.[3]

In addition, many States have developed similar regulations for existing sources not covered by the NSPS. Under section 111(d) of the Clean Air Act, EPA develops emission guidelines for existing sources with respect to non-criteria air pollutants that are subject to regulation under an applicable NSPS -- such as TRS emissions from kraft pulp mills. Several States have adopted these guidelines, which establish a 5 parts per million by volume (ppmv) limit for digesters, multiple effect evaporators, and condensate strippers. In addition, several States have adopted State-only TRS requirements for various LVHC emission points at kraft pulp mills. The following Figure 4-4 summarizes the various NSPS and State regulations.

TIP! For a catalog of EPA determinations related to NSPS applicability, see the ADI Website at http://www.epa.gov/oeca.

General exceptions and alternative standards. As summarized in Figure 4-4, although the NSPS and many State regulations impose a ppmv-based limit on these equipment systems, two general exceptions often will apply:

- If the LVHC gas stream is routed to a lime kiln or recovery boiler that is subject to its own regulatory limit, then that latter limit will apply in place of the limit applicable specifically to the pulping process equipment. For the NSPS, this exception from the 5 ppmv limit only applies if the lime kiln or recovery boiler is subject to the NSPS.

- As an alternative to a ppmv-based limit, regulations allow in many cases for combustion of the LVHC gas stream in an incinerator that meets specific design standards (usually a minimum temperature of 1200°F and a minimum residence time of 0.5 second). This alternative standard is allowed for the NSPS only in situations where NSPS regulated waste gases are combined with other waste gases and sent to either a non-NSPS kiln/recovery boiler, or a power boiler or dedicated incinerator.

Figure 4-4
LVHC Emissions: TRS Federal and State Emission Limits*

Equipment System	TRS Emission Limits	Applicable Regulation
Digester System (includes blow/flash tanks, chip steamers and condensers) and Multiple Effect Evaporators	5 ppmv (dry basis, corrected to a standard O_2 %) (averaging periods vary)	NSPS[1], AL, CA (BAAQMD, SHAAQMD), FL, GA, ME, MS, NH, NC, OH, PA, SC, TN, TX, VA
	0.6 lb/TODP	MD[2]
	0.2 lb/TADP	CA (MENAQMD, NCUAQMD, NSOAPCD), ID[3], NM[4]
	0.5 lb/TADP	CA (BUTAPCD, COLAPCD, FRAQMD)
	Incineration in lime kiln or recovery furnace subject to NSPS TRS limits	NSPS
	Incineration at 1200° F for 0.5 sec.	NSPS[5], CA (MENAQMD, NCUAQMD, NSOAPCD), FL, ID, KY[6], MD, MT, OR (0.3 sec.), WA, WI
Condensate Stripper	5 ppmv (dry basis, corrected to a standard O_2) (averaging periods vary)	NSPS, CA (BAAQMD (15 ppm), SHAAQMD), FL, ME, MS, NC, OH, SC, TX, VA
	0.2 lb/TADP	CA (MENAQMD, NCUAQMD, NSOAPCD), ID[3], MS, NM[4]
	0.5 lb/TADP	CA (BUTAPCD, COLAPCD, FRAQMD)
	Incineration in lime kiln or recovery furnace subject to NSPS TRS limits	NSPS
	Incineration at 1200° F for 0.5 sec.	NSPS[5], CA (MENAQMD, NCUAQMD, NSOAPCD), FL, OR (0.3 sec.), WA

* State regulations updated through August 1997. See Figure 1-2 in Section 1 for information available for updating State information.
[1] Limit not applicable for digesters if uncontrolled TRS rate is less than 0.01 lb/ton ADP from new, modified or reconstructed digester. See other exceptions discussed below.
[2] Limit for combined emissions from digesters, recovery boilers, evaporators, and smelt tanks.
[3] Limit for combined emissions from brown stock washers, black liquor oxidation vents and condensate stripper.
[4] Limit for combined operations at a mill.
[5] Allowed only if gases subject to NSPS combined with other waste gases.
[6] Minimum 98% efficiency. Includes evaporator hot wells.

Back-up control requirements. Various States may require the use of a back-up control system or place limits on the duration of uncontrolled venting. These types of requirements may be imposed through regulation, permit or enforcement-related action. For example, Maine, Georgia and Oregon require that a back-up device or incineration unit be available in the event adequate incineration in the primary device cannot be accomplished due to breakdown, failure, servicing, overload, etc. Maine and Oregon also limit the time frame for venting to the atmosphere during the switch from the primary incineration device to the secondary incineration device (40 minutes for Maine and as soon as possible but no more than 60 minutes for Oregon). Although the NSPS do not have explicit requirements for back-up controls, the only excused excess emission periods under NSPS would be allowable startup, shutdown or malfunction periods.

Monitoring, reporting and recordkeeping (MRR). The NSPS also establish MRR requirements to assure compliance with the emission limits, and many States impose similar requirements. The NSPS require use of Reference Method 16 for all performance tests. In addition, a TRS continuous emission monitoring system (CEMS) may be required to provide ongoing compliance data. If a CEMS is required, it is generally required only downstream of the control device. In many cases, the control device for the TRS emissions from the pulping area will be the lime kiln or power boilers, which are located outside the pulping area.

Figure 4-5
NSPS TRS Monitoring, Reporting and Recordkeeping Requirements for LVHC Units

Applicable Limit	Monitoring	Reporting	Recordkeeping
! If ppmv-based limit applies, then...	! CEMS to monitor and record TRS with span of 30 ppmv, together with a CEMS to monitor and record O_2 by volume on a dry basis with a span of 20%. CEMS located downstream of control devices.	! Semiannual reporting of all 12-hour average TRS concentrations > 5 ppmv by volume, unless gases combusted in an NSPS-affected lime kiln or recovery furnace (in which case NSPS TRS limit for those emission sources applies).	! Record all data and calculate 1-hour averages. Calculate and record 12-hour arithmetic mean average TRS concentrations (corrected to 10% O_2) for the two consecutive periods of each operating day, based on 12 contiguous 1-hour averages.
! If incinerator temp. standard applies, then ...	! Incinerator temperature monitoring applies instead of TRS CEMS. Accuracy specification is within ±1% of temperature being monitored.	! Semiannual reporting of all 5-minute periods when temperature < 1200°F	! Record all combustion temperature monitoring data, if applicable.

4.3.2.2 Cluster Rules Requirements

NOTE! Although control options are similar, temperature and residence time for stand alone incinerators are 1600°F and 0.75 seconds for MACT, as compared to 1200°F and 0.5 seconds for NSPS.

Basic emission limits. With the promulgation of the Cluster Rules, a significant new layer of regulation for the LVHC gases will apply, even though the basic control methods remain the same (i.e. incineration in a stand-alone thermal incinerator or in a lime kiln, power boiler or recovery boiler). Like the NSPS, the MACT requires that a kraft pulp mill control LVHC emission points. However, the MACT standards apply to HAP emissions instead of TRS emissions. Other key features of the basic MACT emission limits are:

Compliance options. The Cluster Rules provide four compliance options for LVHC gases at kraft pulp mills:

- 98 percent reduction by weight (measured as total HAP or methanol),
- Introduce gases with primary fuel or into flame zone of a boiler, lime kiln, or recovery furnace,
- Route to a thermal oxidizer such that gases are subjected to 1600°F for 0.75 seconds, or
- Route to a thermal oxidizer such that the control device outlet concentration does not exceed 20 ppmv (corrected to 10 percent O_2, measured as total HAP or methanol).

These alternatives, and the associated monitoring, reporting, and recordkeeping requirements, are summarized in Figures 4-6 and 4-7, respectively.

Enclosures and closed-vent system. Regardless of the compliance option selected for a particular facility, all LVHC equipment systems need to be enclosed and routed through a closed-vent system to a control device. The basic requirements for these systems and associated monitoring, reporting, and recordkeeping requirements are summarized in Figures 4-8 and 4-9, respectively.

Figure 4-6
MACT Control Options for LVHC System (40 CFR 63.443)

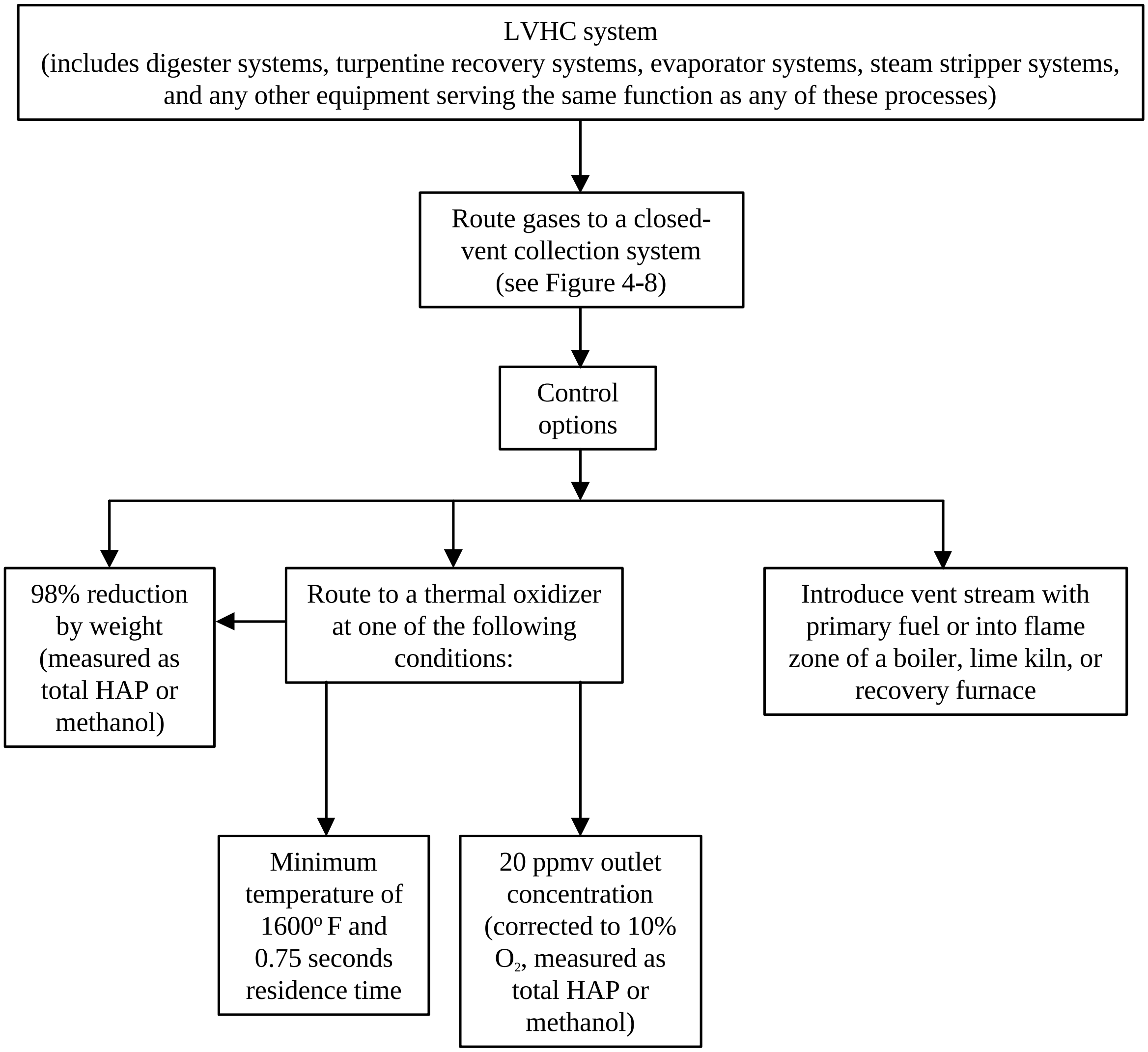


Figure 4-7
LVHC MACT Monitoring and Recordkeeping Requirements

Control Option	Monitoring	Reporting	Recordkeeping
Lime kiln, Recovery furnace, Boiler	None required	N/A	N/A
98% reduction by weight standard (controls other than Thermal Oxidizer)	Continuously record operating parameters from initial or subsequent performance test	Standard Part 63 reporting (i.e., semiannual EER and CMS performance report, except if excess emissions occur, then quarterly reports required)	Standard Part 63 recordkeeping for monitored operating parameters (i.e., both monitor performance data and measured data averages)
Thermal oxidizer used to meet the 20 ppmv outlet HAP concentration standard	Continuously measure total HAP concentration or temperature	Same standard Part 63 reporting as above (for total HAP CMS performance and exceedances)	Same standard Part 63 reqmts. as above (for total HAP CMS)
Thermal Oxidizer used to meet the 98% reduction by weight or a specific design standard (1600 °F and 0.75 seconds residence time)	Continuously measure fire box temperature	! Same standard Part 63 reporting as above (for temp. monitor performance and exceedances) ! If meeting design standard, exceedance value set at 1600°F, with site-specific averaging time; if meeting 98% reduction standard, exceedance value and averaging time are both site-specific (see § 63.453(n))	Same standard Part 63 reqmts. as above (for temp. CMS)

Figure 4-8
MACT Closed-vent System Requirements (40 CFR 63.450)

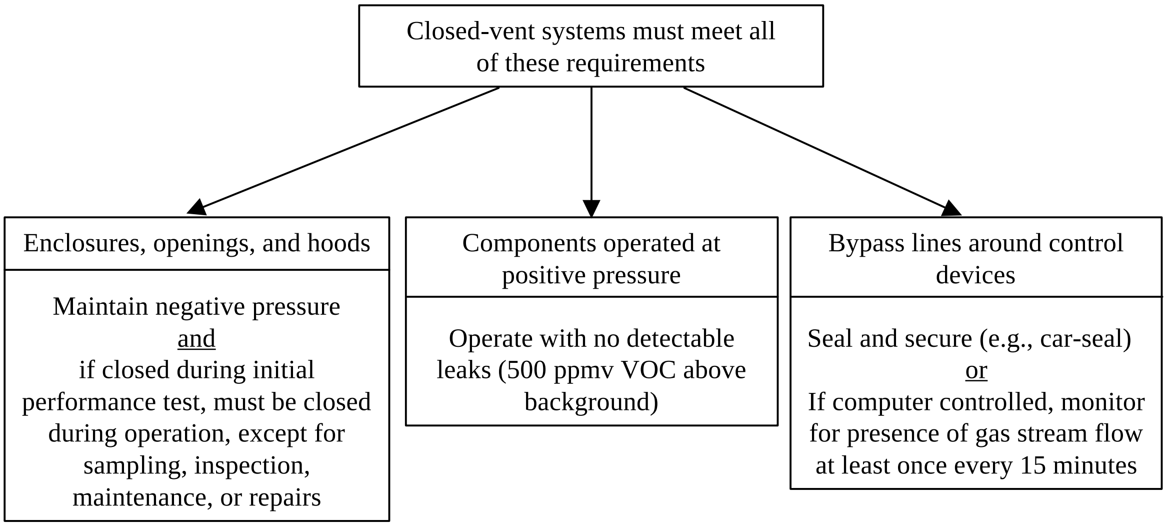


Figure 4-9
Enclosures and Closed-vent System MACT Monitoring and Recordkeeping Requirements

Control Option	Monitoring	Reporting	Recordkeeping
Enclosures and Closed-vent System Requirements apply to all control options (See Figure 4-7)	! *Every 30 days*: Visual inspection of all bypass line valves or closure mechanisms ! *Initially and Annually*: Demonstrate no detectable leaks at positive pressure components. Demonstrate negative pressure at enclosure openings	! None required for 30-day visual inspections ! Initial and annual leak checks/negative pressure demonstrations are subject to general Part 63 performance test reporting requirements	! Prepare and maintain a site specific inspection plan ! Visual check records must be kept because relevant to documenting compliance (§ 63.10(b)(2)(vii)) ! Performance test records must be maintained (§ 63.10(b)(2)(viii))

General exceptions. For the LVHC emission limits, the Cluster Rules also establish an allowable percent of operating time (1%) during which HAP emission levels in excess of the established limit shall not be considered to be a violation of the standard. Periods of excess emissions could include uncontrolled venting to the atmosphere or a monitored fire box temperature lower than the temperature established during the initial performance test (or <1600° if the source is complying with the incinerator design standard). The 1% allowance is in addition to excused periods under the startup, shutdown or malfunction provisions, and is calculated by dividing the time of excess emissions by the total process operating time in a semiannual reporting period. Examples of combustion unit downtime are listed in Figure 4-10. Note that these excess emissions must be evaluated in light of overlapping State TRS requirements, such as the Maine and Oregon examples discussed in Section 4.3.2.1, as well as the NSPS which excludes only allowable startup, shutdown and malfunction periods. Even though 1% of excess HAP emissions may be exempt under the MACT requirements, these periods of excess emissions must still comply with NSPS TRS requirements, and any applicable State requirements.

Figure 4-10
Common Causes of Downtime in Lime Kilns and Power Boilers

Combustion Unit	Cause of Downtime	Typical Duration of Downtime
Lime Kiln	Flame-out	5 to 30 minutes (with backup combustor)
	Calcium oxide ring formation in kiln	Less than 15 minutes (with backup combustor)
	Grate plugging in lime product removal system	Less than 15 minutes (with backup combustor)
	Mud mat formation problems with vacuum drum filter; loss of lime mud feed	20 minutes to 2 hours
Power Boiler	Fuel feeder plugging	15 to 60 minutes
	Rapid decline in steam demand (e.g., paper break on the paper machine) that results in fuel input reduction	15 to 60 minutes

Back-up control requirements. There are no explicit back-up control MACT requirements for the LVHC emission limits. However, the only excused excess emission periods would be those periods that are specifically designated in the startup, shutdown, or malfunction plan developed under § 63.6(e)(3), or those that are less than the allowable excess periods.

Monitoring, reporting, and recordkeeping (MRR). The MACT establishes MRR requirements to assure continuous compliance with the emission limits. All LVHC systems must meet the MRR requirements for enclosures and closed-vent systems (Figure 4-9) and the appropriate MRR for the control option selected (Figure 4-7). The MACT generally relies on parameter monitoring, although a total HAP continuous monitoring system (CMS) is required if the mill elects to meet an outlet concentration HAP limit.

4.3.3 LVHC Air Inspection Techniques

NOTE! Inspection steps for HVLC and LVHC gas collection systems are similar, and this section should be read as generally applicable to both systems.

Because of the significant air emission sources outside of the pulping area (including the lime kiln, recovery boiler and power boilers), the pulping equipment systems in the past often have not been a high priority for committing on-site inspection resources. However, the Cluster Rules requirements can be expected to make the LVHC gas collection systems and other pulping department emission sources a higher priority. For initial compliance, the appropriate steps to follow for coming into compliance with the Cluster Rules are outlined extensively in the OAQPS Cluster Rules Implementation Guideline, including a discussion of applicability and timing issues, as well as initial compliance checklists. This document, therefore, focuses on on-site inspections that will be conducted after initial compliance has been demonstrated and the appropriate permit conditions have been included to address the Cluster Rules.

4.3.3.1 Pre-inspection Steps

As discussed in Chapter 3, there are a number of steps that should be taken routinely prior to conducting an actual on-site inspection, including file (especially permit) reviews. As part of conducting the file review and planning the on-site inspection, the inspector should consider at least the following items:

Process diagrams. Obtain a simplified diagram of the LVHC vent gas collection system(s) and note what control(s) are employed. This type of diagram may be available in the Part 70 operating permits file if submitted with the application.

Use of controls located in other process areas. If the facility combusts the LVHC gases in a lime kiln, power boilers or recovery boiler, the inspection of the pulping area will be abbreviated. However, the inspector will have to check on the continuous use of these combustion process units for TRS/HAP combustion control (or that other permitted backup controls were used during combustion unit downtime periods) when conducting the inspection of the chemical recovery and power boiler areas of the mill. Any downtime will have to be checked against required use of backup controls (if applicable) and/or permitted levels of uncontrolled venting.

Evaluation of periodic monitoring reports. If a dedicated incinerator is used for TRS and/or HAP control, incinerator temperature data will likely be recorded and submitted in a semiannual (or quarterly) excess emission report (EER) of excursions from required minimum temperature requirements. Review reports submitted since the last inspection in order to prioritize the need for follow-up while on-site. If TRS CEMS or total HAP CMS data are available instead of temperature data for the incinerator, evaluate the CEMS data in the same manner.

The inspector should confirm that any periods of excess emissions, including bypass/uncontrolled venting, indicated in the reports are within regulatory limits. If not, the inspector may need to evaluate on-site records that document the reasons for the excess emissions and/or uncontrolled venting. Under the Cluster Rules, records must be kept of all bypass periods. The review will be necessary to evaluate claims of allowable excursions, such as those from startup, shutdown or malfunction periods. For MACT requirements under the Cluster Rules, these types of claims must be evaluated in connection with the facility's startup, shutdown and malfunction plan required under 40 CFR 63.8.

Evaluation of episodic malfunction reports. The inspector should review malfunction/upset reports since the last inspection, if available. If the reports identify corrective actions to be taken by the source, note the need to verify during the on-site inspection that the corrective steps were actually taken and that they resolved the problem.

Also, the inspector can compare claims of malfunction periods on EERs with the duration and timing of malfunction periods indicated on malfunction reports. If a malfunction report is required for all or some specified subset(s) of malfunctions, note any discrepancies between the malfunction reports submitted and the claimed excess emissions in an EER. Significant discrepancies signify either errors in EER or malfunction reporting that should be addressed with the facility either as part of the inspection or by agency compliance staff responsible for processing periodic and episodic reports.

4.3.3.2 On-site Inspection Steps

The appropriate on-site inspection steps must be tailored to the objectives of the inspection and the priority given to the pulping area in a particular inspection. The possible steps for a routine Level 2 inspection include:

Permit verification. One objective of a standard Level 2 air inspection will be to verify that the permit includes all the appropriate equipment. As noted above, the OAQPS Cluster Rules Implementation Guideline contains a detailed discussion of the applicability of the Cluster Rules requirements. Prior to the inspection, the permit should be reviewed to determine what conditions apply to the pulping process. Depending on the nature of the specific permit conditions, the inspector should evaluate a number of potential issues to verify that pulping operations remain consistent with permit requirements, including:

! Are all emissions units properly identified in the permit?

! Have any modifications (including production increases) occurred that could trigger NSPS or NSR? Note that minor modifications in the pulping area may debottleneck downstream processes (such as recovery boiler operations). Evaluate whether the debottlenecking creates potential for a significant emissions increase in other areas of the mill that could trigger PSD/major NSR review. One resource for documenting process modifications that have occurred in the pulping (and chemical recovery area) will be the Best Management Practices (BMP) Plan required under the Clean Water Act -- see Section 4.6.2 and 4.6.3 for further discussion of those requirements.

- Are TRS/HAP control methods properly identified?

- Compare the basic process/design information with conditions in the permit to verify the accuracy of the information in the permit and to support subsequent assessment activities.

- Are permit terms and conditions properly linked to the emissions unit?

Evaluation of limits on uncontrolled releases. Regardless of the control option selected, one key issue is to determine that the source is satisfying the limits on uncontrolled venting of LVHC gases. Because uncontrolled venting will cause even higher emissions than reduced control efficiency, assuring that such episodes are kept to a minimum should be a focal point of the inspection in the pulping area. Uncontrolled venting can occur because either the combustion source/control device for the gases is not operating or because of process upsets that occur within the pulping area. In either case, conduct a review of available records to evaluate that uncontrolled venting meets specific regulatory limits and is also consistent with good air pollution control practices.

NOTE! Consider follow-up assessment if uncontrolled venting or combustion temperature below the excursion level exceed 1% of operating time.

Under the Cluster Rules, the facility will have monitor records indicating the presence of flow through any line that bypasses a control device vent (this does not include safety pressure relief valves). For modern mills, these records likely will be accessible through the facility's distributed control system (DCS) or similar automated data handling system. This information can be used to calculate the total duration of uncontrolled venting to document compliance with restrictions on those events. Although generated for MACT compliance purposes, this information can be used for TRS compliance evaluations as well.

The total duration of uncontrolled venting should be calculated for a period consistent with the reporting period for the facility (quarterly or semiannually) and compared against total operating time for that same period. If the total duration exceeds 1% of the total operating time, further evaluation of the causes of the uncontrolled venting is warranted. Under the Cluster Rules, only uncontrolled venting events caused by allowable startup, shutdown or malfunction (SSM) periods are excluded from calculating compliance with the 1% limit. For TRS control, the NSPS do not include an excess emission allowance (except for recovery furnaces) and State TRS provisions for any excused excess emissions will vary.

If, based on the initial records review, a follow-up investigation appears warranted, the likely root cause concerns will be shutdown of the control device/combustion unit used for control or pulping area process upsets. Where the source relies on a process combustion unit such as the lime kiln for controlling LVHC emissions, excessive downtime of the combustion unit may lead to compliance problems unless the facility has a permitted backup control option. If control device availability is not the cause, then process upsets, such as the following, should be considered:[6]

- Liquor carryover that causes pluggage in the digester relief line. The pressure build-up in the digester could lead to emergency bypass relief.
- Simultaneous digester blows could cause condenser and LVHC gas collection system overload, leading to emergency bypass venting.

The inspector should seek clarification from the facility on the cause of excessive uncontrolled venting and seek appropriate corrective action to address the problem. If uncontrolled venting persists above the 1% Cluster Rules limit as a result of claimed SSM conditions, the inspector should carefully review the facility's SSM plan required by the MACT general provisions (see § 63.6(e)(3)) to assure that the plan is adequate to minimize emissions consistent with good air pollution control practices. For this type of evaluation, consider conducting a comparison of similar mills to determine what additional efforts may be appropriate.

Evaluation of proper operation of control equipment. A Level 2 inspection will focus on assuring that the control equipment is being properly operated and maintained so that the facility continues to achieve compliance with the applicable emission limits. The proper steps for this phase of the inspection will depend on the control measures used for TRS and HAP control, which will generally include enclosures of emissions points and conveyance of the LVHC gases in a closed-vent system that are then incinerated in process combustion units or a dedicated thermal incinerator.

Enclosures and closed-vent system. As part of the Cluster Rules, facilities will have to enclose LVHC emission points and convey the gases through a closed-vent system. The Cluster Rules require the facility to develop a self-inspection plan, including a series of periodic checks, to assure that this system continues to operate properly. Review the records of these activities to assure that the required checks are occurring and that the source has taken any corrective action steps necessary to remain in

Checks of Enclosures/Closed-vent Systems for Suspected Problems with Facility Self-Inspections

- **Visual inspections (ductwork, piping, valves, etc.)**
- **Leak checks using Method 21 analyzer (positive pressure components)**
- **Pressure checks using portable pressure gauge, etc. (negative pressure enclosure/hood openings)**

compliance. If a problem is detected or suspected, the inspector may want to consider conducting the types of checks that the facility is supposed to undertake as part of its self-inspection program.

Process combustion sources. Where the controls used are the lime kiln, power boilers or recovery furnace, the Level 2 inspection within the pulping area is generally inapplicable. See Sections 5 (recovery process) and 8 (power boilers) of this manual for available inspection procedures applicable to these process combustion units. Generally, these combustion units are more than adequately sized and designed for control of TRS or HAP emissions from LVHC gases and thus any increased emission problems likely stem from combustion problems within the combustion unit itself.

Basic Thermal Incinerator Assessment Steps

- **Check monitor for operating condition, including most recent calibration records**
- **Evaluate required monitoring data (temp., TRS, or HAP); check against required limits and for shifts from baseline conditions**
- **As needed, use portable equipment to evaluate temperature and THC outlet concentration against baseline**

Stand-alone incinerator. For a stand-alone thermal incinerator, the evaluation will focus first on the reported monitoring data for monitors required by rule, which may include temperature monitors or a TRS CEMS. The Cluster Rules also provide for use of a total HAP continuous monitoring system, if such a system becomes available in the future. During the on-site inspection, the inspector should:

- *Evaluate the operating condition of the monitor.* For a CEMS or CMS, the daily calibration and periodic QA/QC checks provide a good check. For temperature monitors, there likely will be no QA/QC records or only limited information. Interviews with plant personnel may indicate what procedures the mill uses to verify proper operation of the temperature monitor.

- *Evaluate required monitoring data against permitted levels.* Collect and evaluate current data for the period of the inspection. In addition, if they are readily available, review summaries of recent data such as the past 24 hours or week. The inspector may want to inquire about the ability to analyze data trends using the facility's DCS, especially if there are reasons to believe that the controls may not be functioning effectively.

- *Conduct baseline checks of critical parameter data.* For thermal incinerators, an evaluation of both temperature and outlet total hydrocarbon (THC) concentration data is recommended as part of a Level 2 inspection.[10,11] If these parameters are not covered by required monitoring, a portable gauge or analyzer may be necessary. A comparison of temperature data to prior baseline data allows for an evaluation of whether temperatures are moving in an acceptable range. A comparison of THC outlet concentration at the time of the inspection with previously collected data will allow a baseline comparison to determine if there are increasing organic emissions, even though the temperature data do not indicate a problem. In this case, the THC concentrations would be analyzed to indicate potential control problems, not as a direct surrogate for the regulated HAPs that make up part of the total THC emissions from the equipment systems.

! *Conduct follow-up assessments of incinerator performance as needed.* If the baseline conditions have shifted significantly, then a follow-up assessment of the internal elements of the incinerator may be appropriate. However, the follow-up procedures generally require internal inspections, and thus are generally performed only by mill personnel when the control system is off-line. Internal checks should focus on finding any unusual conditions, such as leakage through the primary heat exchanger, leakage of air into the combustion chamber, or impingement of burner flame on the refractory.[10]

Follow-up assessment for suspected process problems. If the inspection of the closed vent system and control device fails to reveal problems but an emission problem is still suspected, an evaluation of process conditions that could lead to increased emissions may be necessary. Although this type of process-oriented follow-up inspection in the pulping area would be unusual given the nature of the operations and the control methods used, Figures 4-11 through 4-14 outline several examples of process upset conditions that could lead to compliance problems by increasing uncontrolled emission rates.

Figure 4-11
Potential Upsets and Malfunctions in the Digester Relief and Turpentine Recovery System[6]

Upset/Malfunction	Effect	Result
Liquor carryover	Digester relief line pluggage	Pressure build-up in digester which may lead to following events: (1) emergency bypass relief to atmosphere; (2) premature digester blow (may result in overload of blow tank or accumulator)
	Turpentine condenser pluggage or fouling	Reduced condenser heat transfer yielding increased TRS and organics uncontrolled emissions
Low water flow rate to turpentine condenser	Increased condenser water temperature	Increased uncontrolled TRS and organics emissions due to larger portion of gas left un-condensed

Figure 4-11 (cont.)
Potential Upsets and Malfunctions in the Digester Relief and Turpentine Recovery System

Upset/Malfunction	Effect	Result
Failure to close blow valve after blow	Fouling of blow line	Pressure build-up during blowing, increasing digester blow volume and uncontrolled TRS, organics emissions

Figure 4-12
Potential Upsets and Malfunctions in the Blow Tank and Accumulator [6]

Malfunction	Effect	Result
Fiber or liquor carryover and fouling of condensers	Reduced heat transfer and loss of condensate	Increased uncontrolled TRS and organics emissions due to larger blow gas volume
Low water flow rate to condensers or hot water accumulator	Increased condenser water temperature	Increased uncontrolled TRS and organics emissions due to larger portion of gas left un-condensed

Figure 4-13
Potential Upsets and Malfunctions in Multiple Effect Evaporators [6]

Malfunction	Effect	Result
Fouling, scaling, and deposits in evaporator effects	Reduced evaporator efficiency	Results affect recovery boiler emissions **[See Section 5]**
Air leaks in evaporator body	Larger NCG volume	Increased uncontrolled TRS and organics emissions due to increased condenser load
Low condenser water flow rate	Increased condenser outlet water temperature	Increased uncontrolled TRS and organics emissions due to larger portion of gas left un-condensed
High inlet condenser water temperature	Increased condenser outlet water temperature	Increased uncontrolled TRS and organics emissions due to larger portion of gas left un-condensed
Reduced scrubber water flow rate	Reduced liquor-to-gas ratio, lower adsorption rate	Increased uncontrolled TRS and organics emissions due to decreased removal efficiency
Increased scrubber gas volume	Reduced liquor-to-gas ratio, lower adsorption rate	Increased uncontrolled TRS and organics emissions due to decreased removal efficiency

Figure 4-13 (cont.)
Potential Upsets and Malfunctions in Multiple Effect Evaporators

Malfunction	Effect	Result
Scrubber packing flow channeling	Reduced liquor-to-gas contact, reduced adsorption	Increased uncontrolled TRS and organics emissions due to decreased removal efficiency
Liquor foaming	Liquor carryover and reduced evaporator efficiency, lower black liquor solids	Results affect recovery boiler emissions **[See Section 5]**
Entrainment of soap in liquor	Foaming, liquor carryover, and reduced evaporator efficiency, fouling of evaporators, lower black liquor solids	Results affect recovery boiler emissions **[See Section 5]**

Figure 4-14
Potential Upsets and Malfunctions in the Closed-Vent Gas Collection System[6]

Malfunction	Effect	Result
Excessive flow variations	Poor performance of collection system	Fugitive TRS and organics emissions, increased emissions due to incomplete combustion
Operation between lower and upper explosive limits		Potential for explosion
Low gas flow velocity	Operation below flame propagation velocity	Potential for explosion and/or fire
Entrained moisture	Flame blowout, reduced flame temperature, corrosion of gas moving equipment	Increased uncontrolled TRS and organics emissions as a result of incomplete combustion and potential for explosion

4.3.4 LVHC EPCRA Issues

General concerns. The basic regulatory requirements for EPCRA are not process-specific but rather apply on a facility-wide basis. Appendix D to this manual provides an overview of these regulatory requirements.

NOTE! See Appendix D for overview of EPCRA regulations and basic assessment procedures.

For the LVHC air emission points in the pulping area, the key EPCRA issues will be to quantify releases of applicable toxic chemicals in the annual Toxic Release Inventory (TRI) report (known as the "Form R" report), and to comply with emergency reporting requirements. The emergency reporting requirements apply under both EPCRA and CERCLA. The releases subject to these emergency reporting requirements are releases that are not federally permitted and that exceed certain reportable quantities. For certain releases that are "continuous" and "stable in quantity and rate," the mill may be able to use special reporting options so that a notice is not required after each such release. See the discussion of continuous releases in Appendix D for further detail on the differences between standard emergency reporting and reporting of continuous releases.

Air releases from LVHC (or HVLC) points could be subject to EPCRA and CERCLA emergency reporting requirements. Methanol has a reportable quantity threshold of 5,000 pounds per 24-hour period, while the TRS compounds hydrogen sulfide and methyl mercaptan each have a reportable quantity threshold of 100 pounds per 24-hour period.

The determination of what constitutes a "federally permitted release" can be complex. However, it is important to note that if the mill as a matter of normal operations emits an applicable pollutant in amounts that exceed the reportable quantity **and** there is no emission limit established for the pollutant, then the emergency reporting provisions likely apply. For instance, a mill should file appropriate emergency reports if no TRS emission limit currently applies to the LVHC (or HVLC) emission points, and the mill normally emits more than 100 pounds of hydrogen sulfide or methyl mercaptan in a 24-hour period from the unregulated emission points at the mill. In this circumstance, the reduced continuous release reporting options likely are available, as discussed in Appendix D.

Inspection considerations. The EPCRA compliance assessment generally will focus initially on a records review. The inspector should review the following materials:

! *Emergency preparedness information.* These obligations are not process-specific, and thus the basic assessment considerations are covered for all facility operations in Appendix D to this manual.

! *TRI Form R.* Check to ensure that the form is on file and that the source has adequately considered releases associated with the LVHC emission points. Also, ask to see the estimation technique being used. If the estimation technique involves an assumed reduction efficiency for control methods, make sure that the assumed efficiency is consistent with the overall efficiency that the mill is achieving. The overall assumed efficiency should account for any excess emission releases (including uncontrolled venting) in a manner consistent with the actual percent of operating time such releases occur. Uncontrolled emission episodes or periods of reduced control efficiency -- even if allowed under Clean Air Act regulations -- can have a significant impact on the estimate of total releases. This is especially important for LVHC and other pulping process emission points because there are often built-in allowances for anticipated uncontrolled venting for at least some percentage of operating time.

! *Emergency notifications.* Request documentation that the mill has filed all required notices.

If an agency air inspector plans to screen for EPCRA compliance during an air inspection, the inspector should confirm the necessary information with the facility contact during the opening conference or just in advance of the closing conference. For an announced inspection, the inspector should ask the source to have ready EPCRA-related documentation so that this screening check can be performed without interrupting the main focus of the inspection. A screening checklist is included as part of the example inspection form in Appendix E.

In addition to a screening-type records review inspection, an EPCRA inspector may want to conduct further assessments to identify potential compliance concerns with emergency notification requirements. As one technique, the inspector first can check malfunction reports and citizen complaints since the previous inspection. The inspector then should cross-check those incidents with notification records identified in EPA's ERNS database, records on file with State and local emergency officials, or records requested from the mill. If this type of investigation identifies episodes of abnormal emissions in which no notification was provided, further investigation may be required to determine if reportable quantity thresholds were exceeded.

4.4 HVLC Gas Collection System

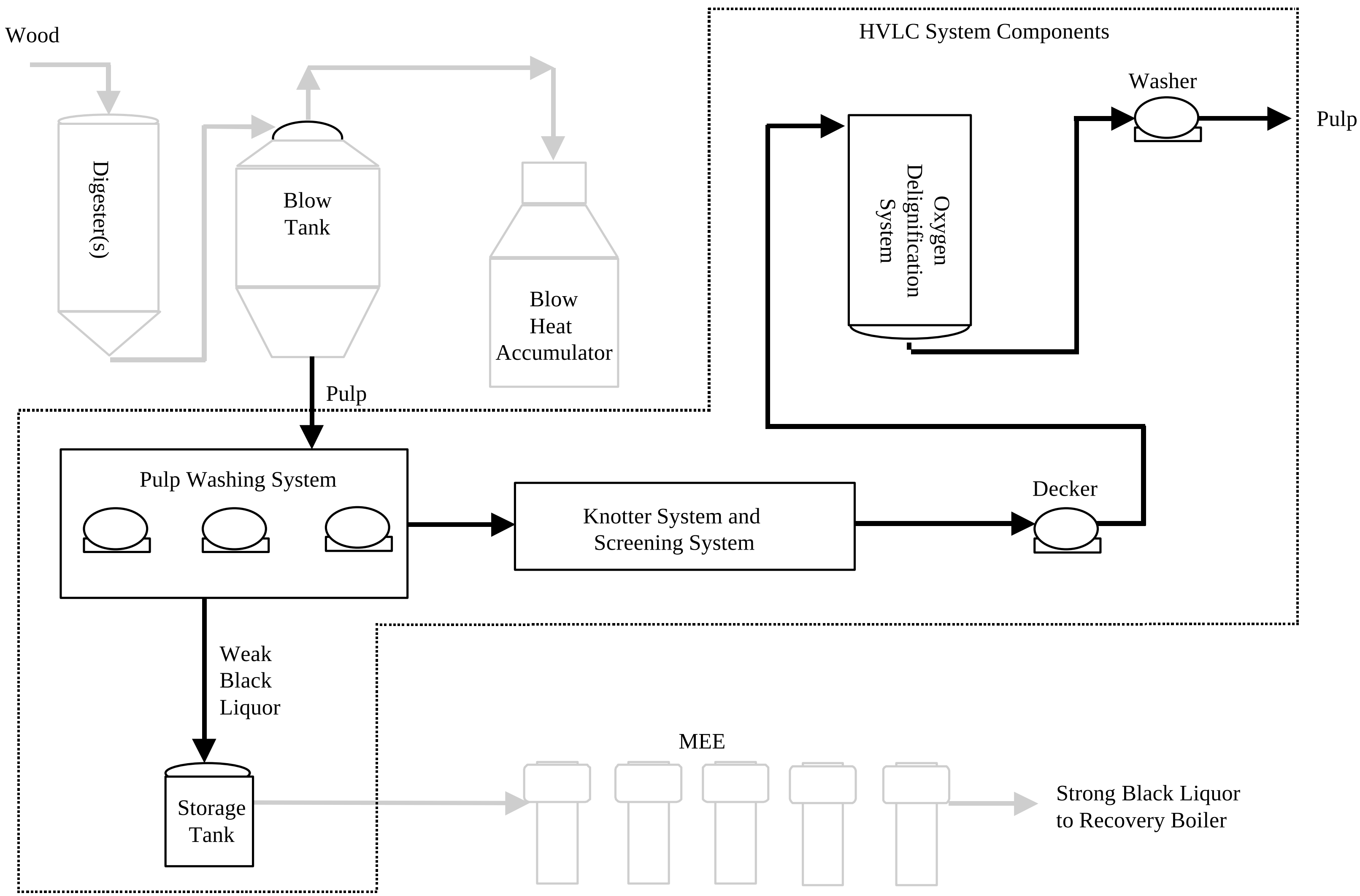
4.4.1 HVLC Emission Points

The primary HVLC emission points are the washing, knotter, screen and decker systems, weak liquor storage tanks, and, where applicable, oxygen delignification systems. These points are identified in Figure 4-15. Because rotary vacuum washers are the most common, Figure 4-15 depicts the use of this washer type. The rotary vacuum washers are hooded and not fully enclosed. Other types, such as a diffusion washer or horizontal belt washer are enclosed or have limited exposure to the ambient air. These more enclosed washer types will tend

Key Features for HVLC Gas Collection

- **Similar to LVHC except air emission points historically less regulated**
- **Cluster Rules add significant new requirements but generally rely on same thermal incineration control options as LVHC gas collection**
- **Clean Condensate Alternative primary difference for air emission compliance assessments**
- **EPCRA obligations similar to LVHC gas collection**

Figure 4-15
Flow Diagram of HVLC System



Equipment enclosed by the dashed line are part of the HVLC system. The remaining equipment are components of the LVHC system.

to have lower flow rates with higher pollutant concentrations. As with the LVHC emission points, the primary emissions of concern are TRS and methanol, although the HVLC points in most cases have lower emission rates than the LVHC emission points.

4.4.2 HVLC Air Regulations

4.4.2.1 TRS Requirements

NOTE! To the extent the NSPS apply, the same monitoring, reporting and recordkeeping requirements that apply to LVHC emission points also apply to the HVLC emission points.

The TRS requirements for HVLC points are similar to the requirements for LVHC points where the regulations apply. However, many of the HVLC points are not subject to TRS regulations. Figure 4-16 summarizes the basic requirements applicable to the HVLC points. As noted in Figure 4-16, new and modified (post - 9/24/76) brown stock washers (including associated knotters, filtrate tanks and vacuum pumps) are regulated by the NSPS.

Figure 4-16
HVLC Emission Points: Federal and State TRS Emission Limits

Equipment System	TRS Emission Limits	Applicable Regulation
Brown Stock Washers (NSPS definition includes knotters, filtrate tanks, and vacuum pumps)	5 ppm (dry basis)	NSPS[1], CA (BAAQMD (15 ppm), SHAAQMD), ME
	0.156 lb/ton, 24 hour average	OR[2]
	0.2 lb/TADP	CA (MENAQMD, NCUAQMD, NSOAPCD), ID[3], NM[4]
	0.5 lb/TADP	CA (BUTAPCD, COLAPCD, FRAQMD)
	Incineration in lime kiln or recovery furnace subject to NSPS TRS limits	NSPS
	Incineration at 1200° F for 0.5 seconds	NSPS[5], CA (MENAQMD, NCUAQMD, NSOAPCD)

[1] Limit not applicable if Administrator determines, on a case-by-case basis, incineration is technologically/economically unfeasible.
[2] Limit for combined emissions from brown stock washers and black liquor oxidation vents.
[3] Limit for combined emissions from brown stock washers, black liquor oxidation vents and condensate stripper.
[4] Limit for combined operations at a mill.
[5] Allowed only if gases subject to NSPS combined with other waste gases.

The NSPS contain an exception for washers if the mill can document that controlling the emissions is technically or economically infeasible. As an example, an exception was granted by EPA Region IV in 1997 where the lowest estimated control cost was over $14,000/ton of TRS (See ADI Control Number 9700087). The practical effect of this exemption should be minimal in the future, however, because the Cluster Rules (as discussed below) require control of these washers without a similar exception. Because the control options are similar for the TRS and HAP compounds, it appears unlikely that -- once compliance with the Cluster Rules HVLC limits is required -- a facility will be able to document economic or technical infeasibility when the cost and technical burdens of installing and operating the controls are already being incurred to satisfy the Cluster Rules.

Finally, EPA's TRS emission guidelines under section 111(d) of the Clean Air Act do not cover brown stock washers or other HVLC points. Consequently, only a few State or local jurisdictions have TRS requirements for HVLC points. Moreover, screens, deckers, weak black liquor storage tanks, and oxygen delignification points are not covered by the NSPS or generally by these State rules.

4.4.2.2 Cluster Rules Requirements

Basic emission limits. Although the TRS requirements for HVLC emission points apply only to brown stock washer systems, the Cluster Rules HAP requirements apply to additional HVLC emission points. Which points are subject to HAP limits and when compliance is required will depend on whether the units involved are new or existing sources. Once applicability and compliance dates are determined, the HVLC sources generally are subject to the same basic control options as the LVHC sources. These elements of the HVLC requirements are summarized as follows:

HVLC System Compliance Dates

- **Existing sources: April 15, 2006**
- **New sources: June 15, 1998 or date of startup, whichever is later**

Applicability and compliance dates. The HVLC system is the only part of the mill that has more stringent MACT control requirements for new sources than for existing sources. In this context, a "new source" is an HVLC system at a pulping system or additional pulping line that is constructed or reconstructed after December 17, 1993. The MACT control requirements for new sources apply to additional emission points (see Figure 4-17) and require compliance by an earlier date (see accompanying text box). The compliance options, however, are the same for new and existing sources.

Figure 4-17
HVLC Emission Points that are Subject to the MACT Standard

Existing Sources

- Pulp washing system
- Oxygen delignification system
- Decker systems that use any process water other than fresh water or papermachine whitewater; or any process water with a concentration of HAPs greater than 400 ppm
- Knotter systems with HAP emissions 0.05 kg/Mg oven dry pulp (ODP)
- Screen systems with HAP emissions 0.1 kg/Mg ODP
- Knotter and screen systems with combined HAP emissions 0.15 kg/Mg ODP

New Sources

- Existing sources plus all...
  - Decker systems
  - Screen systems
  - Knotter systems
  - Weak liquor storage tank vents

Compliance options. Although the applicability issues are different for HVLC and LVHC sources, the basic compliance options for HVLC sources are the same as those for LVHC sources:

- 98 percent reduction by weight (measured as total HAP or methanol),
- Introduce gases with primary fuel or into flame zone of a boiler, lime kiln, or recovery furnace,
- Route to a thermal oxidizer such that gases are subjected to 1600°F for 0.75 second, or
- Route to a thermal oxidizer such that the control device outlet concentration does not exceed 20 ppmv (corrected to 10 percent O_2, measured as total HAP or methanol)

NOTE! Basic HVLC compliance options are the same as LVHC compliance options, except for Clean Condensate Alternative option.

If the gases are subjected to 1600°F for 0.75 second in a thermal oxidizer, then MACT and NSPS requirements are satisfied simultaneously. For all other MACT compliance options, mills must demonstrate meeting NSPS in addition to the MACT requirements.

Enclosures and closed-vent system. As with LVHC systems, all HVLC equipment systems must be enclosed and routed through a closed-vent system to a control device. Due to concerns about explosion hazards, the HVLC gases are not mixed with LVHC vent gases, although the two vent stream gases could be sent to the same control device (i.e., power boiler). The basic MACT requirements for closed-vent systems are summarized earlier in this section in Figure 4-8. Note that equipment systems that are included in the clean condensate alternative are exempt from the enclosure and closed-vent system requirements.

General exceptions. The MACT standards also establish an allowable percent of operating time during which HVLC HAP emission levels in excess of the established limit shall not be considered to be a violation of the standard. However, for HVLC gases, periods of excess emissions may not exceed 4% of operating time, compared to 1% for LVHC emissions. Also note that when HVLC and LVHC gases are controlled by the same control device, periods of excess emissions may not exceed 4% of operating time. All other provisions about excess HVLC emissions are the same as those for LVHC emissions (see the General Exceptions discussion in Section 4.3.2.2).

Back-up control requirements. As with the LVHC emission limits, there are no explicit back-up control MACT requirements for the HVLC emission limits. Refer to the back-up control requirements discussion in Section 4.3.2.2 for additional information.

Monitoring, reporting, and recordkeeping (MRR). These requirements are the same as those for the LVHC system. All HVLC systems must meet the MRR requirements for enclosures and closed-vent systems (Table 4-9) and the appropriate MRR for the control option selected (Table 4-7), unless the equipment is included in the clean condensate alternative.

NOTE! Clean condensate alternative is available only for HVLC -- not LVHC -- emission points.

Alternative compliance approach: The clean condensate alternative (CCA). The clean condensate alternative (40 CFR 63.447) provides a pollution prevention alternative to control requirements discussed in the *Basic emission limits* section above. In general, the CCA allows facilities to meet HVLC system total HAP reduction requirements by reducing the HAP levels of condensates used as process feed water in the pulping, bleaching, causticizing, and papermaking systems. The CCA has the following key features:

- Any technology can be used to achieve HAP emission reductions. However, the facility must demonstrate that the HAP emission reductions using the CCA are equal to or greater than those emission reductions that would be achieved through compliance with the kraft pulping HVLC system standards (98% by weight of total HAP).

- The CCA may be used either for complete or partial fulfillment of the kraft pulping HVLC system standards. This option may be chosen for individual vents or a subset of HVLC vents, and the remaining HVLC vents can comply with the basic pulping vent control requirements described above.

! LVHC emission points are not eligible for participation in the CCA.

! The control strategy using the CCA will vary between mills, depending on mill configuration and emission points selected. Thus, the monitoring and reporting requirements for the CCA are also mill-specific, and must meet the approval of the Administrator.

4.4.3 HVLC Air Inspection Techniques

NOTE! Follow the inspection steps for LVHC gas collection under Section 4.3.3. Also use this section for NSR concerns and if the CCA option is used for HVLC compliance under the Cluster Rules.

To the extent that the HVLC points are regulated, most of the requirements for these points are similar to the LVHC points. Therefore, for most aspects of the inspection of the HVLC points, the inspection procedures should be the same as for the LVHC points (see Section 4.3.3). In addition, the inspector should consider the following issues:

NSR concerns. The increased control of the HVLC points (and the condensates discussed in Section 4.5) to reduce HAP emissions could increase SO_2 and NO_x emissions from the combustion sources used to control the HVLC gases. These increases could be significant enough to trigger NSR permit requirements. The EPA has indicated that generally these increases should not be subject to major NSR review under EPA's pollution control project guidance, although State minor NSR programs would still apply (see 63 FR 18531-32 for further discussion of this issue). However, it is within the State agency's discretion to require major NSR if the State agency believes that the net effect of the controls is not "environmentally beneficial." For instance, the State agency must consider whether the increases in SO_2 or NO_x will cause or contribute to a NAAQS violation or a violation of a PSD increment, or would adversely affect visibility or other air quality related values in a Class I area.

The facility should check with the State agency as to the NSR permit implications of new controls used to comply with MACT requirements for HVLC emissions. As part of the inspector's permit verification for the HVLC points, the inspector should confirm whether NSR permitting is applicable as a result of controls installed for MACT compliance, and if so whether it has been conducted.

CCA options. If a facility elects to implement the clean condensate alternative to satisfy the MACT requirements, then there may be additional procedures necessary to assess compliance with this option. The CCA option will be implemented on a mill-specific basis, including the appropriate monitoring, reporting and recordkeeping procedures.

Therefore, the inspection procedures to determine compliance will also be highly mill-specific. If this option is selected, careful pre-inspection planning will be essential in order to conduct an accurate assessment. The basic assessment steps should involve:

- ! Careful pre-inspection review of the particular elements of the mill's pollution prevention procedures that comprise its CCA implementation strategy, as well as the MRR procedures required to document compliance with the CCA.

- ! Interviews with mill operators to evaluate awareness of the pollution prevention procedures required and the extent to which the mill's standard operating procedures have incorporated these requirements.

- ! On-site review of process and/or control records that document compliance with the mill-specific requirements for CCA implementation.

4.4.4 HVLC EPCRA Issues

For EPCRA, the same issues generally will be present for HVLC points as were present for LVHC points. See Appendix D for a general discussion of the EPCRA regulatory requirements and basic EPCRA inspection considerations. Also see Section 4.3.4 for a discussion of EPCRA issues for LVHC points.

4.5 Condensates

4.5.1 Condensate Discharge Points

> **Key Features for Pulping Condensates**
>
> - **! Regulatory concerns limited primarily to air compliance issues**
> - **! MACT HAP requirements apply, not NSPS/State TRS limits**
> - **! Biological treatment option may involve evaluating controls in wastewater treatment process area**

Condensates in the pulping area contain organic and sulfur compounds that may be emitted to the air. Pulping process condensates are considered to be any HAP-containing liquid that results from the contact of water with organic compounds in the pulping process (in other words, condensed steam from pulping process vent gases). Condensates from the digester, evaporator, and turpentine recovery systems contain the highest loadings of these compounds, with evaporator condensate representing the major volume of pulping area condensate flow. The LVHC and HVLC gas collection systems are also sources of pulping condensates.

The pulping process condensates are collected and routed to a control device and/or conveyed to the wastewater treatment system. Steam stripping is a common control technology for condensates. Steam stripping is a fractional distillation process that involves the direct contact of steam with wastewater. Heat from the steam vaporizes the volatile compounds in the wastewater. The overhead vapor stream is typically incinerated on-site. Mills may condense or rectify the stripper overhead gases and then burn the condensed material in an on-site combustion device. As discussed in Section 4.5.4, this combustion is not subject to RCRA combustion requirements. The steam stripper may be a stand-alone piece of equipment, or, at some mills, it may be integrated into the evaporator system. Steam strippers are currently being used by some mills to control portions of these condensates for odor reduction.

The primary emissions of concern are TRS and methanol. Condensate emission points will be any area where the condensates are exposed to the atmosphere, including open sewers and the wastewater treatment system.

4.5.2 Condensate Air Regulations

Prior to the Cluster Rules, NSPS and State regulations focused only on limiting TRS emissions from steam stripper vent gases. The Cluster Rules, however, require control of both the steam stripper vent gases (as part of the LVHC requirements discussed in Section 4.3) and the pulping process condensates.

Cluster Rules Condensate Requirements

- **Cluster Rules require control of certain condensates**
- **Closed collection system required**
- **Multiple control options available**
- **Steam stripping or biological treatment control options most likely**
- **Condensate segregation option reduces condensate compliance costs**

Basic emission limits. The Cluster Rules require the control of certain condensates from each digester system, turpentine recovery system, LVHC and HVLC gas collection system, and the evaporator system condensates from weak liquor feed stage vapors and vacuum systems. These streams must be captured in a closed collection system and controlled by one of the following options:

- *Recycling.* Recycle the pulping process condensate to an equipment system specified in standards for the pulping system at kraft, soda, and semi-chemical processes that is meeting the closed-vent system and control device requirements of the pulping vent MACT standards

- *WWTP biological treatment*. Discharge the pulping process condensate below the liquid surface of the biological treatment system located at the mill's wastewater treatment plant achieving at least 92 percent total HAP destruction

- *Percent reduction.* Treat the pulping process condensates (generally by steam stripping) to reduce or destroy the total HAP's by at least 92 percent by weight

- *Mass removal.* At mills that do not perform bleaching, treat the pulping process condensates to remove 3.3 kilograms or more of total HAP per megagram (6.6 pounds per ton) of ODP, or at mills that perform bleaching, treat the pulping process condensates to remove 5.1 kilograms or more of total HAP per megagram (10.2 pounds per ton) of ODP

- *Outlet concentration.* At mills that do not perform bleaching, achieve a total HAP concentration of 210 parts per million or less by weight (ppmw) at the outlet of the control device, or at mills that perform bleaching, achieve a total HAP concentration of 330 ppmw at the outlet of the control device. This emission limit is not available to biological treatment systems because of dilution of regulated condensates with other mill wastewaters

> **Closed Collection System Requirements**
>
> - **System consists of hardpiping; covers, water seals, or other emissions control equipment; or venting through closed-vent system to control device (or combination of methods)**
> - **Monthly (30 day) visual inspections**
> - **Leak detection tests for condensate storage tanks**

The pulping process condensates must be conveyed to whichever control device the mill chooses in a closed collection system that is designed and operated to meet the individual drain system requirements specified in §§ 63.960, 63.961, 63.962, and 63.964 of subpart RR. Subpart RR essentially requires that the means of conveyance be leak-free. Air emissions of HAP from vents on any condensate treatment systems (except biological treatment systems located at the mill's wastewater treatment plant) and closed collection systems that are used to comply with the standards must be handled in a closed-vent system and routed to a control device meeting the Cluster Rules LVHC/HVLC standards (e.g., combustion). These are the same closed-vent/control system requirements that apply to LVHC and HVLC gas collection systems (see Section 4.3.2).

General exceptions. For control devices (other than open biological treatment systems that are part of the mill's wastewater treatment plant) used to achieve the percent reduction, mass removal, or outlet concentration treatment options, the Cluster Rules provide a 10 percent excess emissions allowance. For example, the allowance accounts for stripper tray damage or plugging, efficiency losses in the stripper due to contamination of condensate with fiber or black liquor, steam supply downtime, and combustion control device downtime. The 10 percent allowance includes excused periods of excess emissions associated with the startup, shutdown, and malfunction scenarios described in the facilities startup, shutdown, and malfunction plan. Note that although there are no explicit back-up control requirements as part of the Cluster Rules, back-up controls may be necessary for mills that are concerned that this excess emission allowance is inconsistent with expected control device operating experience.

Note that EPA has clarified in technical corrections to the Cluster Rules how this exception applies to control systems other than a steam stripper (see 63 FR 49455, September 16, 1998). As originally written, this exception applied only to steam strippers complying with the percent reduction option. The technical corrections modified this language so that the exception applies to any control device -- except the biological treatment system at the mill's wastewater treatment plant -- used to meet the percent reduction, mass removal or outlet concentration emission limit options. For a stand-alone, enclosed biological treatment system, the 10 percent excess emission allowance would apply. Note, however, that such systems would have to develop site-specific parameter monitoring and would not be subject to the same percent reduction testing and parameter monitoring as systems that are part of the mill's wastewater treatment plant.

Condensate segregation options. The Cluster Rules also contain condensate segregation options that can save costs by minimizing the condensate volume that must be treated. Under the condensate segregation options, the facility has the option of minimizing the condensate volume sent to treatment from the digester system, turpentine recovery system, and weak liquor feed stage vapors and vacuum system condensates in the evaporator system. The concept focuses on the fact that pulping systems may have more than one condensate stream and these streams will vary in concentration of HAP. By segregating condensate streams containing the greatest amount of HAP and treating only these streams, an equivalent emission reduction can be achieved at a lower energy cost (e.g., less steam is required for a lower volume of condensates). The Cluster Rules contain two options for determining if sufficient segregation of the condensate streams has been achieved to qualify for the volume minimization allowance:

- Treat the total volume of LVHC and HVLC collection system condensates, plus at least 65 percent of the total HAP mass from all condensates from the digester system, turpentine recovery system, and weak liquor feed stage vapors and vacuum systems in the evaporator system; or

- Treat any subset of the regulated streams that contain a minimum total HAP mass (3.6 kg/Mg ODP for unbleached mills and 5.5 kg/Mg ODP for bleaching mills)

If sufficient segregation is not achieved, then the entire volume of condensate from the digester system, turpentine recovery system, and weak liquor feed stage vapors and vacuum systems in the evaporator system must be treated.

Monitoring, reporting, and recordkeeping. The monitoring requirements for the condensate emission limits depend on the control option selected. The reporting and recordkeeping requirements require semiannual reports (quarterly if excursions occur) and specify that all records of monitoring parameters must be maintained. The Cluster Rules also require specific records to be maintained of closed-vent system and closed collection system inspections and results of negative pressure and leak detection tests.

The following basic monitoring requirements apply to each control option (no monitoring of the recycling option is required):

Steam strippers generally will use parameter monitoring to determine continuous compliance, based on site-specific parameter excursion values, although a methanol continuous monitoring system (CMS) can be used as an option for monitoring the outlet concentration. The following parameters must be monitored and recorded:

- Process wastewater feed rate
- Steam feed rate
- Process wastewater column feed temperature

Wastewater treatment plant biological treatment systems require an annual performance test in the first calendar quarter to demonstrate, on a total-HAP basis, that the system achieves at least 92 percent reduction efficiency. For each subsequent quarter, the owner or operator must conduct percent reduction tests, on a methanol-only basis, to determine compliance. In addition, there are several parameters that must be monitored on a daily basis including:

- Outlet soluble BOD_5
- Mixed liquor volatile suspended solids (MLVSS)
- Horsepower of aerator units
- Inlet liquid flow
- Liquid temperature

For the outlet soluble BOD_5, MLVSS, and aerator horsepower parameters, an excursion from an established parameter value triggers the need to conduct an additional percent reduction performance test to determine compliance and requires the mill to correct the problem as soon as practical. The inlet liquid flow and liquid temperature values are necessary only to perform the percent reduction test, and are not used to trigger additional tests or for other purposes.

Biological treatment systems that are not part of the mill's wastewater treatment plant would have to submit a plan for monitoring appropriate control system parameters. For each parameter, the mill would have to develop appropriate excursion levels. The parameters would be used to determine continuous compliance and the excursions (subject to the 10 percent allowance discussed above) could be used to document violations of the standard.

Closed collection systems are subject to visual inspection and leak detection requirements. For the gas vents, the self-monitoring (i.e. inspection) requirements are the same as for the LVHC closed-vent and control system requirements (see Section 4.3.2). For the closed collection system used to convey the liquid condensates, the monitoring requirements under Subpart RR apply. The Cluster Rules also impose a monthly visual inspection requirement.

Condensate segregation requires site-specific monitoring to determine that the mill continues to achieve sufficient segregation to qualify for the segregation alternative. The appropriate parameters will be selected on a mill-specific basis. The mill will have to establish excursion values for the monitored parameters.

4.5.3 Condensate Air Inspection Techniques

For pulping condensates, the Cluster Rules add a new activity of regulatory concern that is not addressed by typical TRS requirements. The TRS requirements address emissions for a condensate steam stripper, but do not impose requirements as to which condensates at the mill must be controlled by a stripper or equivalent control. For this reason, this area is likely to be a focal point for potential compliance concerns during the early years of the Cluster Rules' implementation. As described in Section 4.5.2, there are four main steps necessary to achieve compliance with the Cluster Rules' condensate requirements, each of which may involve different assessment techniques:

- *Define the applicable condensates that must be handled and treated in accordance with § 63.446*. As described above, the mill owner or operator has the option of segregating condensates so that not all pulping condensates must comply with the condensate emission standards. If this option is selected, the owner or operator must not only demonstrate initial compliance with the segregation applicability requirements but also must develop a monitoring plan to document that the segregation option continues to satisfy the applicability criteria. As part of the monitoring plan, the owner or operator will have to develop appropriate parameter excursion levels. If excursions occur, the excursions are direct evidence of violations and will be reported quarterly as excess emissions. Assessments will involve pre-inspection reviews of monitoring reports and then on-site checks of current data and proper monitor operation.

- *Convey the condensates in a closed collection system*. The condensate closed collection system includes elements for transfer of the liquid condensates and closed-vent system and control device elements for transferring air emissions from the liquid condensates. The assessment procedures for the closed-vent system and control device requirements will be the same as the procedures required for the LVHC gas closed-vent system and control device requirements. In addition, the inspector will have to assess compliance with the requirements applicable to the liquid closed collection system -- requirements for tanks and individual drain systems.

- *Treat the condensates using one of the compliance options*. If the recycling option is selected, then no monitoring data will be available, and the inspection will consist of verifying that the condensates are in fact recycled to the process equipment. A check of process diagrams and visual observations are the likely techniques. If a steam stripper is used to treat the condensates, then the inspector should evaluate the required monitoring data to determine compliance. If the biological treatment system (wastewater treatment plant) option is used, the inspector will have to evaluate both required parameter and performance test data to determine compliance. If a stand-alone biological treatment system is used, the inspector should evaluate the site-specific parameter monitoring data to determine compliance.

! *Convey the treated HAP compounds in the same manner as the LVHC collection system*. Unless a mill uses the biological treatment system in the wastewater treatment plant, the gaseous (volatilized) HAP emissions from the treatment of the liquid condensates must be conveyed to a control device in the same manner as LVHC gases. Generally, no separate assessment of this requirement will be necessary; because most mills will rely on steam stripping, this requirement is already incorporated into the LVHC requirement (§ 63.443) that the stripper overhead gases be conveyed and treated as part of the LVHC system.

For initial compliance, the appropriate steps to follow for coming into compliance with the Cluster Rules are outlined extensively in the document *Pulp and Paper NESHAP: A Plain Engish Description (EPA-456/R-98-008)*, including a discussion of applicability, timing and other initial compliance issues. This document, therefore, focuses on on-site assessments that will be conducted after initial compliance has been demonstrated and the appropriate permit conditions have been included to address the Cluster Rules.

4.5.3.1 Pre-inspection Steps

As discussed in Chapter 3, there are a number of steps that should be taken routinely prior to conducting an actual on-site inspection, including file reviews. As part of the file review, the inspector should consider at least the following items:

Process diagrams. Obtain a simplified diagram of the condensate handling system(s) and note what control(s) are employed. This type of diagram may be available in the Part 70 operating permits file if submitted with the application. A drawing or schematic of the closed-vent system and control device -- and individual drain systems -- used to handle condensates should also be available as part of a mill's self-inspection plan for these systems (see § 63.454(b), as well as § 63.965(a)(1) for individual drain systems).

Use of controls located in other process areas. If the facility relies on biological treatment, then the control system may be located in the wastewater treatment plant area. Also, if the facility combusts the vent gases from a steam stripper (or other treatment device) in a lime kiln, power boiler or recovery boiler, the inspector must verify the continuous use of these combustion process units for HAP control when conducting the inspection of the chemical recovery and power boiler areas of the mill. Any downtime will have to be checked against permitted levels of uncontrolled venting.

Evaluation of periodic monitoring reports. The mill will have to record and report monitoring data for control devices (e.g., steam strippers or biological treatment systems) used to treat condensates. If the biological treatment system located in the wastewater treatment plant is used, the report will include quarterly performance test data as well. If the mill elects to use the condensate segregation options, the reports will also include the results of condensate segregation applicability monitoring. For each parameter that must be reported, semiannual reporting is required so long as no exceedances occur. Once an exceedance occurs, quarterly excess emission reports (EERs) are required until such time as EPA approves a return to semiannual reporting. The inspector should review reports submitted since the last inspection in order to prioritize the need for follow-up while on-site.

The inspector should confirm that any periods of excess emissions indicated in the reports are within regulatory limits. If not, the inspector may need to evaluate on-site records that document the reasons for the excess emissions and/or uncontrolled venting. The review will be necessary to evaluate claims of allowable excursions. For control devices other than biological treatment systems at the mill's wastewater treatment plant, the Cluster Rules allow for excess emissions for up to 10 percent of operating time (including startup, shutdown and malfunction periods) within a semiannual reporting period without the exceedances constituting a violation. For other monitored parameters with excursion levels, allowable excursions may occur as a result of startup, shutdown or malfunction periods. The inspector should evaluate these types of claims in connection with the facility's startup, shutdown and malfunction plan required under 40 CFR 63.8.

Evaluation of episodic malfunction reports. The inspector should review malfunction/upset reports since the last inspection, if available. If the reports identify corrective actions to be taken by the source, note the need to verify during the on-site inspection that the corrective steps were actually taken and that they resolved the problem. The facility should have records of these corrective actions consistent with the Part 63 SSM Plan.

Also, in evaluating claims of malfunction periods noted on excess emission reports, the inspector should compare the duration and timing of those periods to whether the facility submitted a malfunction report. If a malfunction report is required for all or some specified subset(s) of malfunctions, note any discrepancies between the malfunction reports submitted and claims in an EER of "malfunction" as a cause of excess emissions. Significant discrepancies signify either errors in EER or malfunction reporting that should be addressed with the facility either as part of the inspection or by agency compliance staff responsible for processing periodic and episodic reports.

4.5.3.2 On-site Inspection Steps

The appropriate on-site inspection steps must be tailored to the objectives of the inspection and the priority given to the condensate requirements in a particular inspection. The possible steps for a routine Level 2 inspection include:

Permit verification. One objective of a standard Level 2 air inspection will be to verify that the permit includes all the appropriate standards for the applicable condensate equipment systems. Prior to the inspection, review the permit to determine what conditions apply to the pulping condensates. Depending on the nature of the specific permit conditions, the inspector may then evaluate a number of potential issues to verify that the mill's operations remain consistent with permit requirements, including:

- Are all sources of condensates properly identified in the permit? *(Note: This step is critical if the mill has elected to use the condensate segregation options.)*

- Have any modifications occurred that could trigger NSR or that could affect the condensate segregation applicability requirements for the facility? Have the additional controls associated with HVLC and condensate points triggered NSR based on increases from the combustion control units?

NOTE! Additional controls on HVLC and condensate points as a result of the Cluster Rules may increase SO_2 and NO_x emissions and trigger NSR:

- **EPA believes that the pollution control project exemption from major NSR generally should apply**
- **State minor NSR will still apply and major NSR may apply if the State determines it necessary or for sources located near Class I areas**
- **See 63 FR 18531-32 for further detail**

- Are the HAP control methods identified?

- Compare the basic process/design information with conditions in the permit to verify the accuracy of the information in the permit and to support subsequent assessment activities.

Evaluation of closed collection system. Prior to evaluating the control methods used to treat the condensates, the inspector should determine that the source is satisfying the requirements to maintain a closed collection system. Because the results of inspections and other monitoring of the collection system are recorded but not reported, an on-site records review inspection is necessary to evaluate that the system meets the regulatory requirements.

As part of the Cluster Rules, facilities will have to enclose and convey pulping liquid condensates through a closed collection system. Emissions from the liquid condensates must be handled by a closed-vent system and sent to a control device meeting the requirements for the LVHC and HVLC gas collection systems. The Cluster Rules require the facility to develop a self-inspection plan, including a series of periodic checks, to assure that this system continues to operate properly. The inspector should review the records of these activities to assure that the required checks are occurring and that the source has taken any corrective action steps necessary to remain in compliance.

In addition to the same basic closed-vent system and control device requirements applicable to LVHC/ HVLC gas collection, the condensate requirements also include provisions for individual drain systems and tanks:

Checks of Closed Collection/Closed-vent Systems for Suspected Problems with Facility Self-Inspections

- **Visual inspections (ductwork, piping, valves, water seals, closure devices, junction boxes, unburied sewer lines, etc.)**
- **Leak checks using Method 21 analyzer (positive pressure components and tanks)**
- **Pressure checks using portable pressure gauge, etc. (negative pressure enclosure/hood openings of closed-vent systems)**

For individual drain systems, a self-inspection plan is required and the source should have records of these inspections. The Cluster Rules require visual inspections every 30 days. The key elements of the plan are visual inspections of:

- Water seals used to control air emissions -- check liquid levels
- Closure devices on drains, junction boxes and unburied portions of sewer lines -- check to ensure device is in place and has no defects (gaps, cracks, holes, broken/damaged seals, missing caps, etc.)

If defects are identified, the mill must take corrective action and maintain records of the action taken. Provided appropriate corrective action is taken, the facility will remain in compliance -- the existence of an observed defect by itself is not a violation. The inspector should evaluate the records and interview site personnel to verify that appropriate corrective action was taken. The inspector should pay special attention to claims of a need for delay in repair. Under the Cluster Rules, such delays are allowed if the repair requires emptying or removing the drain from service and there is no alternative capacity for the wastewater handled by the affected drain.

For tanks, the Cluster Rules require the mill to conduct leak checks (using Reference Method 21) initially and annually thereafter. If a leak is detected, the mill must follow specified corrective action procedures and complete corrective action generally within 15 days. The inspector should determine whether the source has records to document compliance with these requirements. In addition, use of a portable leak check analyzer may be appropriate where problems are suspected with particular tanks.

After a review of the applicable records and interviews with mill personnel, if the inspector detects or suspects a compliance problem, the inspector should consider conducting the types of checks that the facility is supposed to undertake as part of its self-inspection program to the extent feasible within time and safety constraints.

Evaluation of proper operation of control equipment. A Level 2 inspection next should focus on assuring that the control equipment is being properly operated and maintained so that the facility continues to achieve compliance with the applicable emission limits. The proper steps for this phase of the inspection will depend on the control measures used for the condensates, which will generally include either recycling to the process, steam stripping, or biological treatment systems.

Recycling. If the facility complies by recycling the condensates to the process equipment, no recordkeeping or monitoring requirements will apply. The inspector should verify through a review of process diagrams and a visual walk-through that the required recycling equipment is in place. In addition, a DCS may provide real time and historical data that documents recycled flow of condensates to the process.

Steam Stripping. This control method is by far the most likely option and is expected to be used in nearly all mills. The main design characteristics of steam strippers that have an effect on removal efficiency are the steam-to-feed ratio (SFR) and the number of trays (or overall packing height). Generally, as either of these increases, removal efficiency will tend to increase.

> **Basic Steam Stripper Inspection Steps**
>
> - **Evaluate required monitoring data (SFR, temp., or methanol CMS); check against required limits and for shifts from baseline conditions**
> - **Check monitors for operating condition, including most recent QA/QC records**
> - **SFR values generally should be at least 1.5 lb/gal.**

The Cluster Rules generally require monitoring of both the steam and feed rates. The mill is required to establish parameter excursion levels for purposes of reporting excess emissions. Although not explicitly stated in the rule, the Agency expects these excursion levels to be expressed as an SFR because the appropriate level for each of these two parameters is dependent on the level of the other parameter. Background data collected in support of the Cluster Rules indicate that a SFR of at least 1.5 lb/gal should be maintained to achieve the 92% reduction required by the rule. The Cluster Rules also require monitoring of the process wastewater column feed temperature. A minimum temperature excursion level will be established during the performance test.

In addition, if the mill elects to meet the Cluster Rules' condensate treatment standard expressed in a ppmw format, the owner can install a methanol CMS at the outlet of the steam stripper to measure the outlet concentration instead of measuring the control device parameters. If this option is selected, the inspector should check recent QA/QC results to assure proper operation of the monitor, and then analyze real-time and trend data, to the extent available, through a DCS or other available records.

The number of trays (or overall height of packing) is fixed by the design of the applicable stripper being used. However, removal of trays for maintenance and repair can occur, and is one of the reasons for the 10 percent excess emission allowance in the Cluster Rules. If excess emissions as detected by the SFR monitoring are high, then an inspector may follow up to examine tray maintenance and repair records to determine whether the mill's O&M procedures for the steam stripper are adequate to minimize emissions.

> **NOTE! This section addresses only biological treatment systems that are located in the wastewater treatment plant area. Other biological treatment systems are subject to site-specific parameter monitoring.**

Use of WWTP Biological Treatment System. As discussed in Section 4.5.2, for this control option the Cluster Rules require the mill owner or operator to conduct percent reduction performance tests on a quarterly basis. In addition, the owner or operator also must monitor five separate parameters on a daily basis (outlet soluble BOD_5; mixed liquor volatile suspended solids; horsepower of aerator units; inlet liquid flow; and liquid temperature). For each parameter the mill must establish parameter excursion levels. For the outlet soluble BOD_5, mixed liquor volatile suspended solids, and aerator horsepower parameters, an excursion triggers the need to conduct a percent reduction performance test (in addition to the scheduled quarterly tests) to determine compliance and requires the mill to correct the problem as soon as practical. The inlet liquid flow and liquid temperature parameters are necessary to conduct the percent reduction test, and are not used for actually triggering the test or other purposes.

To inspect the biological treatment system, the inspector should determine:

- Did each quarterly performance test document that the treatment system met the required percent reduction efficiency?
- Were any performance tests triggered by excursions required during the period reviewed?
- If so, were the tests conducted when and as required?
- If so, what were the results?
- Were the corrective action steps taken in response to the excursion successful in addressing the underlying problem? Examples of potential problems that could result in excursions and failure of the biological treatment system include black liquor spills and aerator malfunctions.

4.5.4 Condensate RCRA and EPCRA Issues

> **NOTE! The Cluster Rules revised RCRA rules to allow on-site burning of condensates derived from steam stripper overhead gases.**

The mill may want to concentrate the methanol stripped from the condensates as supplemental fuel for power boilers to recover the methanol's heating value. There is some possibility that the concentrated methanol condensate would exhibit the hazardous waste ignitability characteristic which potentially could make the use of the methanol condensate in the power boilers subject to RCRA boiler and industrial furnace (BIF) requirements. To encourage recovery of these methanol condensates, EPA -- as part of the Cluster Rules -- added an exclusion from the RCRA definition of a "solid waste" for condensates derived from overhead gases from steam strippers used to comply with the condensate control requirements. This exclusion is limited to on-site combustion. (See 63 FR 18533 for further detail.)

The EPCRA concerns for the condensates generally remain the same as for the LVHC and HVLC gas collection systems. See Section 4.3.4.

4.6 Spent Pulping Liquor, Turpentine, and Soap Management

> **NOTE! Enforcement of CWA BMPs is almost entirely through inspection because each kraft mill will use site-specific methods to implement BMPs.**.

Spent pulping liquor management is an integral component of optimal wastewater treatment operation as well as economic mill operation. The Cluster Rules require kraft mills that bleach pulp to implement measures to prevent or otherwise contain spent pulping liquor, turpentine, and soap. In addition, the management of these materials may trigger RCRA handling requirements or EPCRA/CERCLA reporting requirements. This section describes the:

- Common spent pulping liquor, turpentine, and soap discharge points
- Best Management Practices (BMPs) to control spent pulping liquor, turpentine, and soap and BMP compliance procedures
- BMP inspection steps
- RCRA regulatory requirements, EPCRA/CERCLA reporting obligations, and the associated inspection procedures

4.6.1 Potential Spent Pulping Liquor, Turpentine, and Soap Management Discharge Points

Mills that perform chemical pulping of wood or other fibers generate spent pulping liquors that are generally either recovered in a chemical recovery system or treated in a wastewater treatment system. Spent pulping liquor at kraft mills is comprised of black liquor that is used, generated, stored, or processed at any point in the pulping and chemical recovery process. Black liquor is generated during the cooking process in the digester and contains dissolved organic wood materials and residual alkali cooking chemicals. After separation from the pulp, spent liquor is routed to the chemical recovery cycle. Weak black liquor that is more dilute in nature is separated during pulp washing operations. Some of the weak black liquor is reused in the pulping process, and the rest is sent to the chemical recovery process. The black liquor is evaporated to a high concentration and then burned in a recovery boiler to recover the energy associated with the dissolved organic wood materials and to regenerate cooking chemicals used to pulp the wood.

Some kraft mills, particularly those that used softwood as raw material, isolate soap and turpentine from the spent pulping liquor. Fatty and resin acids found in the wood material become saponified during the kraft pulping process. During black liquor evaporation, the soap becomes insoluble and rises to the surface of the liquor. The soap is removed from one effect of the evaporator to a skimming tank where it is removed. The skimmed liquor is then returned to the next evaporator effect.

Turpentine partitions to the foul condensates when digester relief vent gases are condensed. Typically, the turpentine is recovered by decanting the condensates and skimming the top layer containing the insoluble turpentine. The turpentine is then sent to a storage tank for off-site sale, while the condensates are routed with other pulping area condensates to the wastewater treatment plant (with or without steam stripping, depending on the mill).

NOTE! NSPS Subpart Kb volatile organic liquid tank standards may apply to turpentine and black/green liquor storage tanks, but likely impose only minimal recordkeeping requirements.

Note that the turpentine and black liquor storage tanks (as well as green liquor storage tanks in the chemical recovery area) store materials with volatile organic liquid (VOL) content. Subpart Kb of the NSPS covers new or modified (after 7/23/84) VOL storage tanks with a design capacity of at least 40 cubic meters (approximately 10,000 gallons). Subpart Kb imposes minimal recordkeeping requirements on all applicable tanks and then imposes, based on tank capacity and the true vapor pressure of the stored materials, additional recordkeeping requirements and/or design/control standards. Process vessels meeting the definition in 40 CFR 280.12 of a "flow through process vessel" are exempt from subpart Kb requirements.[12] For turpentine tanks, Subpart Kb generally will impose only minimal recordkeeping (document the tank's capacity) because of the tanks' relatively small size (usually 10,000-20,000 gallons) and the low true vapor pressure of the material stored (estimated to be <1 kPa). The black and green liquor would be affected similarly.

NOTE! BMPs require mills to return spilled or diverted materials to the process to maximum extent the mill determines practicable <u>or</u> to discharge the materials at a rate that does not disrupt the receiving treatment system.

Without careful management, kraft mills can lose pulping liquor through spills, equipment leaks, and intentional diversions from the pulping and chemical recovery areas of the mills. In the absence of adequate collection and recovery (or controlled rate of release to the wastewater treatment plant), intentional diversions can have the same adverse impacts as a spill of similar size. Figure 4-1 depicts the critical systems within the pulping area that involve managing spent liquor and that have the potential for liquor releases. Spent pulping liquor may be accidentally or intentionally released from any of these systems.

Spent pulping liquor losses increase the need for pulping liquor make-up chemicals and decrease energy generated from pulping liquor solids combustion. Liquor losses and spills not only adversely affect economic operation of the pulping process but may also adversely affect wastewater treatment system operations and lead to increased effluent discharges of conventional and toxic pollutants.

Significant sources of black liquor losses from normal process operations include:

- Leaks from seals on brown stock washers
- Leaks from seals on pumps and valves in black liquor service
- Intentional liquor diversions during shutdowns, startups, grade changes, and equipment maintenance
- Sewered evaporator boil-out solutions
- Decker losses at older mills with open screen rooms
- Losses from knotters and screens at mills without fiber and liquor recovery systems for those sources

Unintentional pulping liquor losses at pulp mills are most commonly caused by process upsets, equipment breakdowns (i.e., malfunctioning valves, flanges, and pumps; pipelines corrosion; and lack of preventative maintenance), and tank overfilling. Maintenance and construction in a mill's pulping and chemical recovery areas may cause intentional diversions of pulping liquor to the wastewater treatment system. Research into spill incidents reported through EPA's Emergency Response Notification System shows the following causes of pulping liquor spills[7]:

- Mechanical failure (45%)
- Human error (20%)
- Tank overfilling (16%)
- Intentional diversions (4%)
- Weather (1%)
- Power Failure (1%)
- Unknown (13%)

4.6.2 Spent Pulping Liquor, Turpentine, and Soap Management -- CWA Requirements

With the promulgation of the Cluster Rules, 40 CFR 430.03 requires papergrade kraft mills that bleach pulp to implement BMPs to prevent leaks and spills of black liquor, soap, and turpentine. (Note that these requirements also apply to soda mills as well.) The primary objective of BMPs is to proactively prevent losses; a secondary objective is to reactively collect, contain, recover, or control spills and losses that do occur. The BMP requirements are designed to provide kraft mills the flexibility to implement general mill-specific management controls, combined with various engineering controls and monitoring systems to achieve these objectives. The BMPs include the following elements:

- Return of diverted or spilled liquor, turpentine and soap to the process to the maximum extent practicable as determined by the mill
- Establishment of preventive maintenance programs for equipment in spent pulping liquor, turpentine and soap service
- Continuous, automated monitoring systems (i.e., alarms, conductivity monitors, or pH meters) on storage tanks, in process areas, in process sewers, in process wastewater, and in the wastewater treatment plant to detect leaks, spills, and intentional diversions
- Annual training for personnel involved with operating, maintaining, or supervising operation of equipment in spent pulping liquor, turpentine, or soap service
- Preparation of reports evaluating spill events not contained in the immediate process area
- Establishment of a program to review any planned facility modifications and construction activities in the pulping and chemical recovery facilities
- Installation of secondary containment for spent pulping liquor bulk storage tanks or an annual tank integrity testing program coupled with diversion structures
- Installation of secondary containment for turpentine bulk storage tanks
- Installation of curbing or diking systems for turpentine and soap processing areas
- Wastewater treatment influent monitoring to track BMP performance and effectiveness and to detect trends in spent liquor losses (EPA has recommended in the Technical Support Document [8] that mills monitor for COD, but 40 CFR 430.03(h)(2)(i) of the Cluster Rules provides that other parameters related to spent pulping liquor loss also may be used)

In addition, kraft mill operators and owners must develop a BMP Plan which specifies the procedures and practices each mill will employ to meet BMP requirements. Details of the practices listed above are in the *Technical Support Document for Best Management Practices for Spent Pulping Liquor, Spill Prevention, and Control*.[8]

4.6.3 Spent Pulping Liquor, Turpentine, and Soap Management -- CWA Inspection Techniques

As a result of the new BMP requirements, water inspectors will have to evaluate operations in the pulping area, in addition to the bleach plant and wastewater treatment plant. Consequently, inspectors should carefully review all available materials prior to the on-site inspection to become familiar with the pulping and chemical recovery areas.

4.6.3.1 Pre-inspection Steps

As discussed in Chapter 3, there are a number of steps that should be taken prior to conducting an actual on-site inspection, including file reviews. As part of the file review, the inspector should consider the following items:

Permit review. For direct discharges, BMP requirements are implemented through the NPDES permit. For indirect discharges, BMPs are pretreatment standards and, thus, apply directly to the indirect discharger. Inspectors should review permits to determine the required schedule for implementing BMPs.

Evaluation of the BMP Plan. Each kraft facility that chemically bleaches pulp must complete its BMP Plan by April 15, 1999 (or the date its NPDES permit containing BMP requirements is issued, whichever is later). In addition to detailing the measures a mill will implement to comply with the BMPs discussed in Section 4.6.2, the BMP Plan must be based on a detailed engineering review of the pulping and chemical recovery systems. If the permitting authority instructed the facility to submit the BMP Plan (which is not required by the Cluster Rules) the inspector should review the document prior to the mill inspection. If the permitting authority did not instruct the facility to submit the BMP Plan, the inspector should contact the facility to ensure these materials are made available upon arrival. The Cluster Rules specifically require the kraft facility to maintain a complete copy of the current BMP plan on its premises and to make it available to EPA and the State agency upon request. See 40 CFR 430.03(g).

Evaluation of periodic monitoring reports. As part of the Cluster Rules, mills must conduct daily monitoring of the influent to wastewater treatment systems, expressly for the purpose of tracking the performance of the BMP program. Alternative monitoring points may be selected to isolate possible sources of spent pulping liquor, soap, or turpentine from other sources of organic wastewaters. Although the monitoring program may, from time to time, detect large releases of spent pulping liquor, that is not the specific purpose of this monitoring. The monitoring is intended to systematically measure progress in reducing losses of spent pulping liquor, soap, and turpentine through effective use of BMPs and to assure that the BMP program continues to be effective over time.

Mills must measure BMP effectiveness by establishing action levels. Each facility must establish its own action levels and identify them in the BMP Plan. Mills have the flexibility to choose the statistical methodology they will use to establish these action levels. The action levels must consist of a lower action level, which if exceeded, will trigger investigative requirements, and an upper action level, which if exceeded, will trigger corrective action requirements. It is important to note that exceedance of an action level does not constitute a violation; however, failure to take action called for in the BMP Plan when an action level is exceeded for the time period specified in the BMP Plan does constitute a violation.

The results of the monitoring program must be submitted to permitting authorities at least once a year. Inspectors should review the monitoring reports to determine whether the mills experienced excessive pollutant discharge from uncontrolled or intentional discharge of spent liquor, soap, or turpentine that may have required the mill to perform corrective actions. In the review, inspectors should:

- Compare monitoring results with the BMP Plan to determine whether actions levels were exceeded

- Note general trends of the monitoring results, especially those that demonstrate poor performance, for discussion with mill personnel during the on-site visit

Inspectors should note that any exceedances of the action levels that resulted from a spill or intentional diversion should be documented in the spill records described below (see Section 4.6.3.2).

Process diagrams. If the BMP Plan is not available prior to the inspection or does not include a process diagram, the inspector should obtain a process diagram of the pulping, washing, and turpentine and soap processing systems and note what spill prevention and control devices are employed.

4.6.3.2 On-site Inspection Steps

BMPs require mills to closely document spent pulping liquor, soap, and turpentine management. As a result, appropriate on-site inspection steps should include a review of the reporting and recordkeeping. In addition, inspectors should verify that appropriate influent monitoring measures are implemented, that appropriate actions were taken if action levels were exceeded, and that preventive maintenance measures are performed.

Evaluation of the BMP Plan. As mentioned above, inspectors should review the BMP Plan to become familiar with the procedures the mill determined necessary to comply with the BMP requirements. Inspectors should review the BMP Plan and inspect the pulping area to:

- Ensure the BMP plan contains all required elements
- Evaluate whether the monitoring parameter selected by the mill is appropriate
- Determine whether the mill has achieved the objectives outlined in the plan, as well as whether it has achieved compliance with the rule's BMP requirements
- Ensure mills update the plan, as elements of the program are implemented
- Determine whether mill updates action levels when required, as elements of the program are implemented. Final action levels that reflect operation of the fully implemented program must be established by January 15, 2002 (or the date an NPDES permit containing BMP requirements is issued, whichever is later)

Evaluation of training records. Training is an essential element of a proactive approach to prevent spent pulping liquor, soap, and turpentine losses by reinforcing operator awareness, preventive maintenance, and daily management. Mills are required to maintain initial and refresher training records for all personnel involved with operating, maintaining, or supervising operation of equipment in spent pulping liquor, turpentine, or soap service. These records must be maintained for three years from the date they were created. Inspectors should review these records to determine whether mills are achieving the training goals outlined in the BMP Plan.

Evaluation of repair records. Mills are required to track the repairs of equipment in spent pulping liquor, soap, and turpentine service. These records must be maintained for three years from the date they were created. Inspectors should review these records to ensure mills have implemented the control measures outlined in the BMP Plan as well as to determine whether mills have implemented changes to equipment as a result of an unintentional spent pulping liquor spill to prevent reoccurrence.

Evaluation of spill records. Mills must prepare brief reports that evaluate each spill or intentional diversion that is not contained in the immediate process area. Inspectors should review these reports to confirm that they describe the equipment involved, the circumstances leading to the incident, the effectiveness of the corrective actions taken to contain or recover the spill or intentional diversion, and plans to develop changes to equipment and operating and maintenance practices as necessary to prevent reoccurrence. The status of planned changes should be reviewed with mill staff.

Visual inspection. Referring to the BMP Plan, inspectors should perform a visual inspection of a mill's pulping process area to determine whether the monitoring systems and containment structures specified in the plan have been implemented. Mills have until April 17, 2000 for monitoring systems and April 16, 2001 for containment structures (or the date a NPDES permit containing the BMP requirement is issued, whichever is later) to implement the following:

- *Continuous automated alarm systems* (i.e., alarms, conductivity monitors, or pH meters) on storage tanks, in process areas, in process sewers, in process wastewater, and in wastewater treatment plant. Inspectors should determine whether the alarm signals (audio or visual) on the tanks are in the locations specified in the BMP plan and provide sufficient notice to allow operator response. Likewise, inspectors should visually inspect the process areas, process sewers, and wastewater treatment plant to ensure conductivity monitors or pH meters are placed in the appropriate locations and provide sufficient signal for operator response.

- *Secondary containment structures* are required for turpentine bulk storage tanks and are one option for spent pulping liquor bulk storage tanks. Mills will detail the measures they will use to meet BMPs in the BMP Plan and inspectors must determine whether these structures and management systems are in place by the required date.

- *Curbing or diking systems* are required for turpentine and soap processing areas. Again, mills will detail the measures in the BMP Plan and inspectors must determine whether these structures are in place.

Evaluation of tank integrity testing. Mills may opt to implement tank integrity testing, rather than install secondary containment structures, for spent pulping liquor bulk storage tanks. If this option is used, inspectors should review the procedures used to perform tank integrity tests and the results of such tests. Note that some permits may specify minimum integrity testing requirements. Inspectors should determine whether the mill achieves the minimum requirements by reviewing the available testing records.

Evaluation of pulping and chemical recovery equipment construction or modification program. Whether to meet the Cluster Rules requirements or to modernize mill operations, mills will install new equipment or controls in the pulping and chemical recovery areas. BMPs require a program to evaluate construction and modification activities. This required program is intended to ensure that the prevention of spills and leaks is considered while mills implement changes in the pulping and chemical recovery areas. Inspectors should review documentation of this program.

Evaluation of activities related to influent monitoring program. As mentioned above, mills must conduct daily monitoring of the influent to wastewater treatment systems (or at an alternative location) to track the performance of the BMP program. Remember, influent monitoring is intended to systematically measure progress in reducing losses of spent pulping liquor, soap, and turpentine through effective use of BMPs and to assure that the BMP program continues to be effective over time. While on-site, the inspector should:

NOTE! Inspectors should interview mill staff and review records to determine whether mills responded to any exceedances of the action levels. Exceedance of the action levels does not constitute a violation; however, failure to take action does constitute a violation.

! Interview mill staff to discuss any exceedances of action levels or trends noted during the pre-inspection of periodic monitoring reports. BMPs require mills to conduct investigations when lower action levels are exceeded and to complete corrective actions when upper action levels are exceeded. Inspectors should determine whether mills responded to any exceedances of the action levels because failure to take action called for in the BMP Plan when an action level is exceeded constitutes a violation. If the action levels are exceeded, inspectors should also discuss pollution prevention measures that may be implemented to reduce treatment system loadings.

! Review the sampling procedures for the parameter the mill selected for monitoring to ensure they are appropriate and consistent with any permit requirements (e.g., conductivity would be inappropriate for monitoring soap and turpentine).

! Determine whether an appropriate sampling point is monitored to measure the effectiveness of BMPs. Some mills will select locations further upstream from the final influent stream to the wastewater treatment plant to better isolate problem areas (i.e., pulp mill, chemical recovery operations, and bleach plant).

! Collect a sample, if appropriate, to verify the accuracy of the sampling program.

4.6.3.3 Root Cause Assessments

Where the initial inspection identifies potential problems with the source's BMP implementation, more detailed review of the BMP procedures for the facility may be appropriate. The Agency has recently examined two instances of NPDES permit violations that were caused by spills and accidental releases of materials from the pulping area of kraft pulp mills. These specific cases, along with information from an industry association survey of spill prevention and control practices and information gained from EPA site visits formed the basis for and approach to the BMP requirements included in the final Cluster Rules. As a general proposition, it is clear that instituting the physical measures included in the final Cluster Rules, along with a proactive, management-supported program of training, maintenance and operator awareness, will prevent many accidental releases and capture and return to the process many other spills and intentional diversions. Further improvement is also found in a careful analysis of the root causes of those spills and releases that occur in spite of the proactive BMPs that may be in place.

In conducting the root cause analysis performed in the wake of one of the cases noted above, it was found that a process valve had failed to actuate in response to the control room signal, and that the control circuit did not include a feedback signal providing valve position status to the operators. As a result, the operator’s initial action to remedy an upset condition was not effective and a large quantity of foul condensate and spent pulping liquor was sewered. The spike of organic material and black liquor solids was sufficient to render the waste water treatment plant ineffective, even though the wastewater treatment plant (WWTP) operators recognized the change in influent color and took "defensive measures." The resulting releases from the WWTP resulted in a substantial fish kill and the permitting authority ordered a mill shutdown.

The root cause analysis required as part of the Consent Order issued as a result of the NPDES permit violation not only uncovered the specific cause noted above, but also was generalized into a series of design and operating changes in the pulping and evaporator areas. In the months that followed, the mill measured a 57% reduction in BOD levels contained in WWTP influent. It is clear that the review of the incident not only determined the cause of the specific event, but also led to a general improvement in the efforts to reduce accidental losses of spent pulping liquor.

By requesting and reviewing information on the mill’s follow-up root cause investigation of incidents, the inspector should be able to construct a list of questions that will determine if: (1) the cause was sufficiently well defined to put in place equipment and/or procedures to prevent a recurrence of the same event in the future; (2) the "lessons learned" were sufficiently "generalized" to allow them to be applied elsewhere in the mill to prevent similar occurrences in the future; and (3) the information was communicated via training and written procedures to all personnel that would benefit from the new information.

4.6.4 Spent Pulping Liquor, Turpentine and Soap Management -- RCRA Issues

Subtitle C of RCRA regulates "solid waste" that is "hazardous." Under RCRA, "solid waste" is defined generally as "any garbage, refuse, sludge . . . and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial . . . operations[.]" (42 USC 6903(27)). EPA has determined, however, that spent pulping liquors being reclaimed are not "discarded" and hence not "solid wastes," due to their integral involvement in the kraft process. See 40 CFR 261.4(a)(6) and 50 FR 641-42 (Jan. 4, 1985).

In addition, there is a general exclusion for wastewaters discharged pursuant to an NPDES permit (which excludes the actual discharge from regulation under RCRA, although all units upstream of this discharge are not automatically excluded). RCRA also exempts wastewater treatment tanks from regulation. See 40 CFR 264.1(g)(6). Thus, if spent pulping liquor that is to be discharged to wastewater treatment is managed in impoundments rather than wastewater treatment tanks, the impoundment would require full regulation under RCRA if the spent liquor exhibits one of the four RCRA hazardous waste characteristics.

Another RCRA issue would be spills that are not recycled into the process or discharged with wastewater pursuant to an NPDES permit. One possible source for this type of RCRA-regulated discharge would be leaks from surface impoundments if the spent liquor exhibits one of the four RCRA hazardous waste characteristics. Spills to the ground could also be an issue.

If a mill uses surface impoundments to contain spent pulping liquors, leaks from these impoundments could trigger RCRA generator requirements, or RCRA corrective action may be necessary to address the problem. As part of an air or water inspection, a screening tool would be to determine whether impoundments are used. An appropriate follow-up would be to investigate what types of liners or monitors are used to prevent/detect leaks.

Another potential concern are general spills or leaks that affect the ground in the pulping area. A screening technique for an air or water inspector would be to identify any obvious evidence of potential spill areas. Typical indications of potential problems are: discoloration, puddling, dead vegetation, or evidence of liquid channeling on the ground area around piping, tanks, and similar areas.

4.6.5 Spent Pulping Liquor, Turpentine and Soap Management -- EPCRA Issues

As with other pulping area operations, the mill may have to take into account discharges associated with management of spent pulping liquor and other residuals in preparing TRI Form R reports. The inspector should verify that the reports include estimates for these activities.

The handling of these materials can also raise potential emergency reporting obligations. For instance, air releases that are not federally permitted and that exceed certain reportable quantities require EPCRA/CERCLA emergency reporting. Also, as noted above, EPA's ERNS database documents numerous emergency notifications related to spills or intentional diversions of spent pulping liquor that result in abnormal discharges to receiving waters.[8]

One method for an air or water inspector to screen compliance with these reporting requirements is to note whether any upsets have been recorded by the mill. A list of recorded upsets can be forwarded to the EPCRA inspector for further evaluation. For the EPCRA inspector, these types of upset records provided by other media inspectors, as well as citizen complaints or other tips, can be used to follow up and determine whether sources have provided appropriate reports of incidents covered by EPCRA/CERCLA emergency notification requirements.

The basic inspection procedures contained in Appendix D provide further detail on procedures and decision steps for conducting a follow-up EPCRA emergency reporting inspection, and the example assessment form in Appendix E contains an example checklist for screening compliance with these requirements.

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SECTION 5: ASSESSMENT MODULE FOR CHEMICAL RECOVERY OPERATIONS

5.1 Introduction

CONTENTS

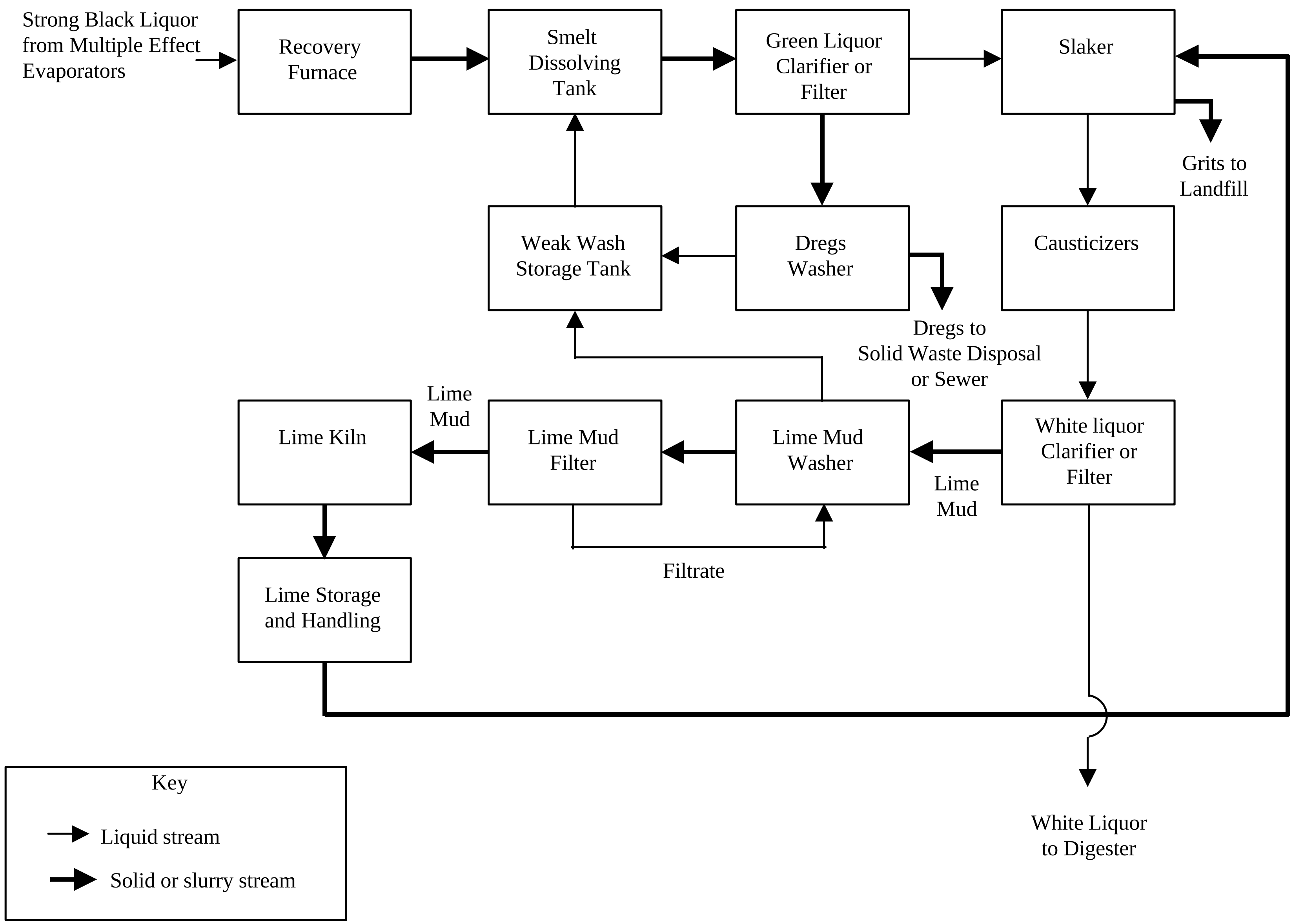
The chemical recovery area contains large air emission sources that are a significant regulatory concern. The recovery process also involves many other equipment systems that will involve less significant air emission concerns, as well as water and solid waste issues. After a brief overview of the process area, this section of the manual focuses first on the main equipment systems of regulatory concern (recovery furnaces, smelt dissolving tanks, and lime kilns) and then addresses the other miscellaneous equipment systems. In addition, Appendix E contains an example assessment form specifically designed to address the issues raised in this process area.

5.2 Overview of Process and Discharges

5.2.1 Description of the Process

Recovery, reconstitution, and reuse of spent cooking liquor to produce fresh cooking liquor is necessary for viable economic operation of most chemical pulp mills. Figure 5-1 provides a simplified schematic diagram of the kraft chemical recovery process. At kraft mills, concentrated black liquor from the multi-stage evaporators is burned in a recovery furnace to generate energy from combustion of organic constituents in the liquor, leaving a molten smelt consisting of sodium sulfide (Na_2S) and sodium carbonate (Na_2CO_3). The smelt is then dissolved in water to form green liquor. The green liquor is causticized with lime, precipitating calcium carbonate and leaving an aqueous solution of sodium hydroxide and sodium sulfide (fresh white liquor), which is reused in the digesters. The calcium carbonate is converted to quick lime via calcination in a lime kiln for reuse in the recausticizing cycle.[1]

Figure 5-1
Flow Diagram of Kraft Chemical Recovery Area



5.2.2 Air Pollutant Emissions

The recovery furnace and lime kiln are the most significant, regulated sources of air pollution in this area and have the following emission characteristics:

- *Particulate matter/HAP emissions*. Both recovery furnaces and lime kilns employ particulate control devices. The particulates will also contain HAP compounds (metals). The recovery furnace will also have some gaseous HAP emissions. Under proposed MACT standards, the mill would use the existing particulate matter control equipment and general operating practices to achieve compliance.

- *TRS emissions*. Good combustion practice is used to control TRS emissions, although older recovery furnaces that use a direct contact evaporator (DCE) design may also use a black liquor oxidation (BLO) system to reduce TRS emissions. Newer recovery furnaces use a non-direct contact evaporator (NDCE) design that results in lower TRS emissions than the DCE design. As described in Section 4, the lime kiln often will be used as the control device for TRS emissions from various pulping operations.

- *SO_2, NO_x and CO emissions*. Although these emissions are not subject to specific federal regulations, state regulations may apply, as well as NSR or operating permit requirements. Add-on control equipment is not generally used for these pollutants.

Other units in the chemical recovery area also are sources of air emissions, with particulate matter emissions the primary concern. The smelt dissolving tank is a source of particulate matter, is often subject to specific regulation, and generally will use some form of low energy wet scrubber. Other units that may be covered by requirements, such as generic opacity regulations or site-specific limits, would include the slaker, lime mud washing system, and various storage and handling units.

Figure 5-2 indicates the typical air emissions from the various equipment systems in the recovery process. The regulatory and inspection issues for the recovery furnace, smelt dissolving tank and lime kiln are discussed in Section 5.3. The other miscellaneous air emission sources are discussed in Section 5.4.

Figure 5-2
Typical Air Emissions from the Chemical Recovery Processes at a 1000 Ton Per Day Kraft Mill

Pulping System Components	Typical Emissions (tons/yr)[1]				
	Methanol	SO_2	NO_x	TRS	PM[2]
Recovery Boiler (NDCE)	23	534	315	17.5	350
Smelt Dissolving Tank	23	35	Not Available	3.5[3]	175
Lime Kiln[4]	14	52.5	210	14[3]	87.5
Other Causticizing Area Sources[5]	56	Not Available			

1 Values are uncontrolled, except where otherwise indicated. Values are based on AP-42 factors (SO_2, TRS, and PM), 1997 EPA Chemical Pulping Emission Factor Document [13] (methanol), and Air Pollution Engineering Manual [4] (NO_x). Values also assume 350 operating days per year.
2 Based on controlled emissions (ESP for recovery furnace, venturi scrubber for lime kilns, and mesh pad for smelt dissolving tanks)
3 TRS values based on use of water low in sulfides in smelt dissolving tank and associated scrubber, and efficient mud washing and optimal kiln operation.
4 Represents emissions from lime kiln with scrubber.
5 Sources include green and white liquor clarifiers, causticizer/slaker vent, and lime mud washer systems

5.2.3 Water Pollutant Discharges

In many mills, the later steps of black liquor processing may be located in or near the chemical recovery area. These steps raise significant water discharge issues. However, this manual addresses all black liquor processing in the pulping process discussion; see Section 4.6.

For the remaining equipment systems, the chemical recovery process is a less significant source of wastewater at most kraft pulp mills compared to the pulping and bleaching processes. During the recovery of kraft pulping chemicals, water is used to wash the solid precipitates formed in the recovery cycle. Washing recovers sodium- and sulfur-containing compounds from green liquor dregs and lime mud. This weak wash water is reused in the recovery cycle to dissolve the smelt and as a scrubbing medium for air emission scrubbers. The excess weak wash is discharged to the wastewater treatment plant.[1] No specific regulatory concerns associated with the wastewater from the chemical recovery process apply, and thus water-related issues for this area are discussed only briefly in Section 5.4, which covers the miscellaneous equipment systems that involve washing.

5.2.4 Solid/Hazardous Waste Discharges

Two primary solid waste discharges from the recovery area that must be handled and disposed of are green liquor dregs and lime slaker grits. Green liquor dregs may be sewered and sent to the wastewater treatment plant or landfilled as solid waste. Lime slaker grits generally are landfilled. There are opportunities for beneficial reuse of these materials, such as using them as a cement additive. Although not generally a RCRA hazardous waste concern, these wastes can exhibit the corrosivity hazardous waste characteristic (which applies to wastes containing free liquids that have a pH 2 or 12.5). Generally, these materials are dewatered prior to disposal, and thus would not meet the corrosivity characteristic under RCRA. However, if they do contain free liquids when disposed of, some care must be taken to assure that the pH of these wastes is controlled to be <12.5 so that the mill can handle the material as non-hazardous solid waste.[2,3] Similar concerns can arise for lime muds that are directed into surface impoundments or landfills for disposal as a result of a process upset. In many circumstances, lime mud would be an aqueous waste that could potentially qualify as a waste exhibiting the corrosivity characteristic. Finally, it should also be noted that although the particulate matter removed by the recovery furnace is another possible source of solid waste, mills generally will recycle this material to the spent black liquor stream to recover any remaining cooking chemicals and reduce solid waste handling.[8] These RCRA issues are discussed in Section 5.4.

5.2.5 EPCRA Chemicals and Reportable Releases

Facilities will have to provide information on hazardous chemicals used in the chemical recovery process to satisfy EPCRA's emergency preparedness provisions. Appendix D contains a process-based list of chemicals that may be covered in an inventory for a typical mill. In addition, the mill likely will have to file TRI Form R reports for on-site air, water, and land releases of TRI toxic chemicals that originate from the recovery process. Land releases include both on-site land disposals and off-site waste transfers that contain TRI toxic chemicals. Finally, EPCRA/CERCLA emergency reporting could apply to releases that are not federally permitted and that exceed a certain reportable quantity. As noted above, although EPCRA concerns based on spent liquor spills may arise in or near the chemical recovery area, all spent liquor concerns are addressed collectively in the pulping area discussion (see Section 4.6). The remaining types of incidents are most likely to be associated with the primary air emission sources. These EPCRA/CERCLA reporting issues are discussed briefly in Section 5.3.

5.3 Recovery Furnaces, Smelt Dissolving Tanks and Lime Kilns

These emissions units are subject to significant CAA and State regulation, including proposed MACT requirements, and may raise EPCRA/CERCLA reporting obligations as well. This section describes the:

- Emission points involved
- Air regulations that apply and air compliance inspection procedures
- EPCRA reporting obligations and EPCRA inspection procedures

Key Features of Primary Chemical Recovery Equipment Systems

- **Significant PM air emissions with large add-on control devices**
- **Non-air emission issues generally are minimal**
- **Proposed MACT rule will expand NSPS-type monitoring to existing non-NSPS units**
- **Effective use of computerized data capabilities important for compliance assessment**

5.3.1 Air Emission Points

Recovery furnaces constitute a critical source of particulate matter, TRS, SO_2, NO_x and certain HAP emissions. The furnaces predominantly use electrostatic precipitators (ESPs) for particulate matter control. For TRS emissions, the key control method is proper process operation, although black liquor oxidation (BLO) is used with older direct contact evaporator (DCE) furnaces.[4] Generally, specific controls are not applied for either SO_2 or NO_x at this time. However, as States develop NO_x reduction programs as part of ozone attainment strategies, recovery furnaces may become increasingly subject to NO_x requirements.

Smelt dissolving tanks, although subject to federal and State regulations, are less significant sources of particulate matter and TRS than the recovery furnaces. For particulate matter control, these tanks are generally equipped with low-energy scrubbers. TRS emissions are generally controlled through proper process operation.[4,7]

Lime kilns, like recovery furnaces, constitute a primary source of particulate matter and NO_x emissions in the chemical recovery process, as well as TRS emissions. For particulate matter control, lime kilns are generally equipped with wet scrubbers (especially venturi scrubbers), although ESPs may be used on new units. TRS emissions are controlled through proper process operation.[4] As with recovery furnaces, lime kiln NO_x emissions may become increasingly subject to ozone attainment NO_x requirements.

5.3.2 Applicable Air Regulations

5.3.2.1 Non-HAP Requirements

Basic emission limits. The federal New Source Performance Standards (NSPS) for kraft pulp mills (40 CFR part 60, subpart BB) apply to recovery furnaces, smelt dissolving tanks and lime kilns constructed or modified after September 24, 1976, for both TRS and particulate matter emissions. Several States also regulate these sources for TRS and PM, and some States also impose SO_2 limits on these units. Also, for new or modified emission units, a NSR permit may establish additional limits, including more stringent requirements than NSPS.

Moreover, a recovery furnace that uses fossil fuel as a supplemental fuel source may also be subject to standards for steam generating units, such as NSPS subparts D, Db, Dc, or state regulations applicable to combustion sources. Because recovery furnaces generally use fossil fuels for only a small porion of their total fuel, these steam generating unit standards may apply only in a limited fashion. The Agency has determined that Subpart D applies to recovery furnaces only if fossil fuels account for 10 percent of total fuel usage. For Subpart Db, the SO_2 percent reduction standards do not apply if fossil fuel use is 30 percent. The Agency has prepared applicability determinations that further discuss how these NSPS boiler requirements apply to recovery furnaces.[12] (See also the discussion in Section 8 about the various regulatory requirements that may apply to power boilers at a kraft pulp mill.)

With the exception of these power boiler requirements, Figure 5-3 summarizes which federal and state air regulations specifically apply to kraft mill recovery furnaces, smelt dissolving tanks, and lime kilns. The following key features of these regulations should also be noted:

- *Recovery furnace TRS/SO_2 standards.* The NSPS regulations for TRS emissions from recovery furnaces establish a general 5 ppm standard (corrected to 8 percent O_2), although there is a separate 25 ppm standard (same O_2 correction factor) for cross-recovery furnaces. Several of the states establish different TRS standards for different types and ages of recovery furnaces. The standards are generally expressed on a ppm basis, ranging from 3 ppm to 40 ppm, although some states use a lb/TADP format, ranging from 0.1 to 0.6 lb/TADP. As noted below, several states also have SO_2 limits applicable to recovery furnaces. Nearly all of these limits are on a ppm basis ranging from 200 to 2000 ppm.

- *BLO requirements.* It should be noted that vent gases from BLO systems are not regulated under NSPS due to the prohibitive cost and declining use of BLO.[4] A few States and several California local districts, however, have established TRS limits that apply to black liquor oxidation. These limits include both ppm limits (15 or 20 ppm) and lb/TADP limits (0.2 or 0.5 lb/TADP).

- *Recovery furnace PM standards.* For particulate matter emissions from recovery furnaces, the NSPS establishes a 0.044 gr/dscf standard (corrected to 8 percent O_2) as well as a 35 percent opacity standard. Most states regulate particulates on a lb/TADP basis, ranging from 2 to 4 lb/TADP. One state, however, regulates particulates on the basis of lb/3000 lb of black liquor solids, and others regulate particulate matter emissions in a similar form to the NSPS. Several states also have opacity limits (from 35-45 percent) that apply specifically to recovery furnaces; while others will have general opacity standards that apply. One state, Michigan, also has specific operating requirements for ESPs used to control particulate emissions from recovery furnaces. Those types of O&M limits may apply as site-specific permit limits in other states as well.

- *Smelt dissolving tank TRS standards.* For smelt dissolving tanks, the NSPS establish a TRS limit of 0.033 lb/ton of black liquor solids as H_2S. Most states also regulate TRS from this source on the basis of lb/ton of black liquor solids, although some establish limits on a lb/TADP or ppm basis. Again, some states also establish SO_2 limits for smelt dissolving tanks in the same manner as for recovery furnaces.

- *Smelt dissolving tank PM standards*. For particulate matter emissions from smelt dissolving tanks, the NSPS establish a limit of 0.2 lb/ton of black liquor solids. Of the states that establish particulate matter limits for this equipment, most use a lb/TADP format at varying levels.

- *Lime kiln TRS standards.* The NSPS establish an 8 ppm limit (corrected to 10 percent O_2) for TRS. State TRS limits for existing lime kilns generally range from 20 to 40 ppm, although some jurisdictions use a lb/TADP format ranging from 0.2 to 0.5 lb/TADP. Some States also establish SO_2 limits for lime kilns in the same manner as for recovery furnaces.

- *Lime kiln PM standards.* The NSPS establish a limit of 0.067 or 0.13 gr/dscf (corrected to 10 percent O_2), depending on whether gaseous or liquid fuel, respectively, is being used. Several States have also established specific PM emission limits for lime kilns, although the format of the standards vary. Because of the predominant use of wet scrubbers, the NSPS do not include an opacity standard for lime kilns, and only a few States establish specific opacity limits for this equipment. However, generic state opacity requirements may apply, as well as specific permit conditions.

Figure 5-3
Federal and State Emission Limits for Recovery Furnaces, Smelt Dissolving Tanks, and Lime Kilns

Systems	Regulations[1]							
	NSPS				State			
	TRS	PM	SO_2	Opacity	TRS	SO_2	PM	Opacity
Recovery Furnaces	Yes	Yes	No	Yes	AL, AZ, CA[2], FL, GA, ID, KY, ME, MD, MS, MT, NH, NM, NC, OH, OR, PA, SC, TN, TX, VA, WA, WI	AK, ID, OR, WA, WI	AL, AK, FL, ID, KY, MS, NH, NM, OR, TN, VA, WA, WI	FL, OR, TN, VA, WA
Smelt Dissolving Tanks	Yes	Yes	No	No	AL, CA, FL, GA, ME, MD, MS, NH, NM, NC, OH, OR, PA, SC, TN, TX, VA	CA, MS, WA, WI	AL, CA, ID, KY, NH, NM, OR, TN, VA, WA	OR, WA
Lime Kilns	Yes	Yes	No	No	AL, AZ, CA, FL, GA, ID, ME, MS, NH, NM, NC, OH, OR, PA, SC, TN, TX, VA, WA	CA, MS, WA, WI	AL, CA, ID, KY, MS, NH, NM, OR, TN, VA, WA, WI	OR, WA

[1] Only regulations specific to kraft pulp mills are included. Other NSPS requirements (such as subpart Db) or general State standards (such as generic opacity requirements) may also apply.
[2] For purposes of this table, "CA" indicates that one or more air quality management districts in California have specific applicable regulations.

Monitoring, reporting, and recordkeeping (MRR). The NSPS for kraft pulp mills also establish MRR procedures for the recovery furnace, smelt dissolving tank, and lime kiln emissions. TRS continuous emission monitoring systems (CEMS) are generally required for recovery furnaces and lime kilns, but no TRS-related monitoring is required for smelt dissolving tanks. An opacity CEMS is required after the ESP controls on the recovery furnace, and control device parameter monitoring (pressure drop and scrubbing liquid supply pressure) is required where a wet scrubber is used to control particulate matter emissions from a smelt dissolving tank or lime kiln. Figure 5-4 summarizes these NSPS MRR requirements, and the following additional issues should be noted:

- *ESP monitoring on new lime kilns.* Although ESPs are used on some new lime kiln installations, the NSPS do not have any required monitoring for this control option when used for lime kilns. Even with this regulatory gap, states can still require an opacity CEMS or other monitoring as part of the new source review permitting process for these new kilns.

- *Recovery furnace excess emission allowance.* The NSPS contain specific exceptions for a limited duration of excess emissions of TRS or opacity from recovery furnaces. For TRS emissions, excess emissions of one percent or less are not considered indicative of a violation of 40 CFR 60.11(d) so long as the owner or operator can document proper O&M for minimizing emissions. For opacity, the exception is 6 percent or less. These periods exclude excess emissions caused by excused start-up, shutdown or malfunction conditions. Although not explicit in the NSPS, EPA has noted that these allowances must be taken into account in determining whether a facility has violated the TRS and opacity limits (not just the § 60.11(d) general O&M duty).[5] These excess emission allowances do not apply to the smelt dissolving tanks or lime kilns.

- *Scrubber parameter reporting.* The NSPS do not require a mill to establish parameter excursion levels or report parameter excursions. However, Part 70 operating permit requirements (including both Part 70 periodic monitoring and Part 64 compliance assurance monitoring, as applicable) likely will result in permit conditions requiring the mill to both establish parameter excursion levels and submit semiannual reports. Moreover, these excursion levels and reporting requirements would be required explicitly under the proposed MACT rules.

- *TRS data availability.* In previous NSPS applicability determinations, EPA has noted that a valid data hour requires both the TRS CEMS data and the O_2 data used to correct to a standard O_2. Although excess emissions are calculated based on 12-hour averages, EPA has indicated that no minimum number of valid hours is necessary to calculate the 12-hour average.[6]

Figure 5-4
NSPS Monitoring, Reporting and Recordkeeping Requirements for Recovery Furnaces, Smelt Dissolving Tanks and Lime Kilns

Process/ Pollutant	Monitoring Requirements	Reporting and Recordkeeping Requirements
Recovery Furnaces/ TRS Emissions	! TRS CEMS required ! Span generally set at 30 to 50 ppm ! O_2 CEMS required to correct to a standard % O_2 ! Located downstream of control devices ! Temperature monitoring possible alternative in some situations under NSPS (and State) regulations ! Note: Other parameter monitoring possible in some State regulations on case-by-case basis	! Calculate and record on daily basis 12-hour average TRS concentrations (corrected for O_2) for the two consecutive periods of each operating day ! Average equals the arithmetic mean of the appropriate 12 contiguous 1-hour average TRS concentrations ! Excess emissions not indicative of 40 CFR 60.11(d) violation if occur 1% or less of operating time
Recovery Furnaces/ PM Emissions	! Opacity CEMS required	! Calculate and record each 6-minute average ! Report as excess emissions any 6-minute average that exceeds the applicable opacity standard ! Excess emissions not indicative of 40 CFR 60.11(d) violation if occur 6% or less of operating time
Wet Scrubbers (Smelt Dissolving Tanks & Lime Kilns)/PM Emissions	! Continuous pressure drop and scrubbing liquid supply pressure monitors (accuracy specification: ±300 Pascals for pressure drop and ±15% for supply pressure monitors) ! Note: Other parameter monitoring possible in some State regulations on case-by-case basis	! Record applicable measurements once per shift ! No reporting applies

5.3.2.2 Proposed MACT Rule Requirements

NOTE! These MACT standards are not yet final. Check http://www.epa.gov/ttn/uatw/pulp/pulppg.html for new developments.

At the same time that the Cluster Rules were promulgated, EPA proposed MACT requirements for certain chemical recovery equipment systems. (See 63 FR 18753, April 15, 1998.) Because EPA has not yet finalized these standards, they are not discussed further in this manual.

5.3.2.3 Asbestos NESHAP Requirements

In addition to the basic emission limits applicable to the recovery boiler and lime kiln, a number of mills may have asbestos-containing material used to insulate steam pipes or used for similar purposes in the chemical recovery area. Any demolition or renovation activity that involves the asbestos-containing material may be subject to the requirements in 40 CFR Part 61, Subpart M. Generally, Subpart M requires prior notice of demolition/renovation activity that will disturb a certain amount of asbestos and requires compliance with a number of work practice and waste disposal requirements. Figure 5-5 briefly summarizes these requirements.

5.3.3 Air Inspection Techniques

5.3.3.1 Pre-inspection Steps

As discussed in Section 3, there are a number of steps that should be routinely taken prior to conducting an actual on-site inspection, including file and permit reviews. As part of this review and to plan the on-site inspection, the inspector should consider at least the following items:

Process diagrams. Obtain a simplified diagram of the affected units and note what control(s) are employed. This type of diagram may be available in the Part 70 operating permits file if submitted with the application. At this stage, the inspector should also attempt to understand how the control rooms for the operations are set up, what process and control parameters can be evaluated from the control rooms, and what distributed control system (DCS) data capabilities are on-site. A significant part of the on-site inspection for these process units will occur in the control rooms, and an upfront understanding of what data are available -- both real-time data and historical data from a DCS -- can streamline the on-site investigation phase.

Evaluation of periodic monitoring reports. The NSPS for kraft pulp mills require that CEMS data for TRS emissions and opacity be recorded and submitted in a semiannual excess emission report (EER) for recovery furnaces. An EER is also required for a lime kiln TRS CEMS. The NSPS do not require reporting of wet scrubber control device parameters, but such reports may be required under a Part 70 permit or as a result of the proposed MACT rules. The inspector should review any reports that have been submitted since the last inspection in order to prioritize the need for follow-up while on-site.

The inspector should confirm that any periods of excess emissions indicated in the reports are within regulatory limits. If not, the inspector may need to evaluate on-site records that document the reasons for the excess emissions. The review will be necessary to evaluate claims of allowable excursions that may apply, including both regulatory allowances for a certain percent of excess emissions, and excused startup, shutdown, or malfunction periods.

Figure 5-5
Asbestos Demolition and Renovation (D&R) Requirements
(40 CFR Part 61, Subpart M)

Regulatory Area	Requirements
Applicability	! Covers regulated ACM (RACM) only: friable asbestos, certain "Category I" nonfriable material with >1% asbestos that has become friable, or other "Category II" nonfriable material with >1% asbestos that likely will be crumbled/pulverized or be reduced to powder as a result of the D&R activity [see 40 CFR 61.141 for all definitions] ! For pipes, the D&R activity must affect 80 linear meters (260 linear feet) ! For other facility components, the threshold is 15 square meters (160 square feet) ! For planned renovations, consider all planned activities for the calendar year in determining total amount of RACM that will be disturbed ! A number of exceptions and alternatives also apply [see 40 CFR 61.145(a)]
Notice Requirements	! General rule is written notice 10 working days prior to the removal activity begins (i.e., any activity that could disturb the RACM), or at least 10 days before end of the calendar year preceding the year in which applicable planned renovation activity occurs ! Follow-up notice required if the amount of asbestos affected changes by 20%, or if start date of work changes ! Exceptions apply for emergency D&R activities ! Regulations prescribe elements that must be included in the notice and require use of form included in Subpart M (or a similar form)
Work Practices	! General rule is to remove RACM prior to any activity that could break up/disturb the RACM or preclude access for subsequent removal ! Wetting requirements apply in numerous stripping and other situations, although use of ventilation system to a glove bag and leak tight wrapping with no visible emissions is alternative for stripping procedures, and leak tight wrapping is alternative to wetting after removal. Other wetting exceptions apply ! Careful handling procedures to preclude disturbing the RACM apply ! Other specific requirements apply
Waste Disposal	! Additional work practice standards apply for handling RACM ! Must deposit the RACM at a landfill that meets specific Subpart M requirements ! A RCRA-type manifest system must be used by the facility, with follow-up reporting required if the generating facility does not receive a receipt from the disposal facility within 45 days ! Other specific requirements apply

Evaluation of episodic malfunction reports. The inspector should review malfunction reports submitted since the last inspection, if available. If the reports identify corrective actions to be taken by the source, the inspector should note the need to verify during the on-site inspection that the corrective steps were actually taken and that they resolved the problem.

Also, if malfunction reports are required for all or some specified subset(s) of malfunctions, the inspector should note any discrepancies between the malfunction reports submitted and claimed "malfunction" periods in an EER. Significant discrepancies indicate errors in EER or malfunction reporting that should be addressed with the facility either as part of the inspection or by agency compliance staff responsible for processing periodic and episodic reports.

5.3.3.2 On-site Inspection Steps

The recovery furnace and the lime kiln generally are a focal point for on-site inspections of pulp mills. Except for visible emission observations and some potential visual checks of the control equipment, the on-site inspection for these units will focus on evaluating control room data. Modern mills are likely to have a single control room that covers both recovery furnace and smelt dissolving tank operations. The room may have a DCS with critical process-related data, as well as housing the CEMS/parameter data. The lime kiln generally will have a separate control room, and may include other operations such as the slaker, causticizer and receiving/conveying units.

The possible steps for a routine level 2 inspection include:

Permit verification. Verify that the permit properly identifies the recovery furnace, smelt dissolving tank and lime kiln. The inspector should also assess whether any modifications have been made, including changes in production that involve a physical or operational change, that could trigger NSR. NSR applicability determinations are complex and a full overview of this issue is beyond the scope of this manual. However, examples of possible NSR concerns include:

- Increasing black liquor solids concentration fired in recovery furnaces or incremental increases in mass of black liquor solids firing. These changes in operation can result in increased recovery furnace NO_x emissions and increased emissions of other pollutants at other units by debottlenecking production.

- Underestimating SO_2 emissions from new recovery boilers. Oil firing capacities need to be considered carefully in the NSR permitting process.

Visible emissions observations. Check for visible emissions if weather conditions permit. Optimally, formal visible emission observation (VEO) tests (i.e., Method 9 or state equivalent) should persist for at least 30 minutes (one reading each 15 seconds, and then averaged into 6-minute intervals). Plot the 6-minute averages to determine if any cyclic patterns are present, and note the timing and duration of all significant opacity spikes. For an ESP, conduct the VEO concurrently with a complete rapping cycle if possible. The following additional considerations apply:[9]

- *ESP emissions.* Check for any condensing plume at the stack discharge. A condensing plume is often indicated by a clear zone directly above the stack, is typically bluish-white or yellow-white in color, and does not disperse like steam.

Where visible emissions are high or a condensing plume is visible, the inspector should conduct a level 2 follow-up inspection of the recovery furnace or lime kiln ESP (as outlined in Figure 5-7).

! *Wet scrubber emissions.* Conduct a qualitative check of visible emissions for clear indications of potential problems. A formal VEO likely will be difficult because of the condensed water droplets in the plume exiting the wet scrubber. The inspector must observe the plume at a point immediately downwind of the point where the condensed water droplets evaporate. The residual plume at this point is often bluish-white, brownish-white or gray; while, the portion of the plume dominated by water droplets is often a bright white. It should be noted, however, that VEOs of the residual plume are not always possible because plumes from various sources may have merged, or high relative humidity will result in long distances before the water droplet plume dissipates. Also, for the smelt dissolving tank in particular, the location of the stack within the mill in relation to other mill facilities (such as the recovery furnace) may make it difficult to observe the plume from an appropriate viewing angle.

Evaluation of TRS CEMS data. Both the recovery furnace and lime kiln may have a TRS CEMS installed. The CEMS data should be the focal point for TRS compliance for these units. The inspector should confirm that the monitors are functioning properly by reviewing the most recent QA/QC checks, such as daily calibration results. In addition, if the periodic reports include excessive monitor downtime, the inspector should follow-up to see if the monitor availability problems have been corrected. The inspector can evaluate monitor data availability records since the last report period, although interviews with mill personnel can also be effective to assess the causes of the problems and the mill's approach to correcting the problem.

If the monitors are functioning properly, real-time data can be recorded to document conditions at the time of the inspection. The inspector should also determine what CEMS data trend analysis capability is available from the DCS or other PC-based system. The historical data can then be reviewed to identify any trends in the emissions profile of the units, or particular periods for which further review may be warranted.

If problems are detected, the follow-up inspection should focus on the recovery furnace BLO (if used) or process operations designed to assure proper combustion of the TRS components. These inspection elements are discussed in the following subsections.

Evaluation of proper operation of control equipment. A critical interest of a level 2 inspection will be to evaluate whether control equipment is being properly operated and maintained. The appropriate steps for this phase of the inspection will depend on the control equipment used for TRS (e.g., BLO systems) and particulate matter (e.g., ESPs or wet scrubbers).

Black liquor oxidation systems. Malfunctions in the BLO system used with direct contact evaporator recovery furnaces generally result in reduced oxidation efficiency, which produces elevated TRS concentration from the recovery furnace. These increased concentrations will be indicated by a TRS CEMS, if required. Where a BLO is used on a DCE furnace that is not equipped with a TRS CEMS, a basic inspection should include documenting proper operation and maintenance of a kraft BLO system. Some key possible BLO malfunctions and associated effects that result in increased outlet liquor sulfidity and TRS emissions are summarized in Figure 5-6.

Figure 5-6
BLO Malfunctions and Associated Effects[7]

Malfunctions	Primary Effect Causing Increased TRS Emissions
Reduced air flow volume through oxidation tank	Reduced oxidation of sodium sulfide
Plugging of air sparge	Stratification of liquor air column and reduced contact
Increased liquor flow	Decreased liquor residence time and oxygen adsorption
Liquor foaming	Foam carryover limits system liquor volume and blowing rates
Increased inlet liquor sulfidity	--

Basic ESP Assessment Steps

- **Conduct VEO**
- **Check opacity CEMS data**
- **Evaluate T-R set electrical data**

Electrostatic precipitators. In addition to the VEO (discussed above), the inspector should evaluate opacity CEMS data and transformer-rectifier (T-R) set electrical data as part of a basic inspection for a unit controlled by an ESP. These evaluations can involve direct comparison of the data with emission or operating limits contained in the mill's permit, but should also involve comparisons with baseline conditions established in prior inspections, a recent performance test, or through accepted engineering principles. See the general discussion of baseline inspection techniques in Section 3.

The following recommendations and discussion summarizes material presented in the *Baseline Inspection Techniques: Student Manual* [9] and EPA's *Operation and Maintenance Manual for Electrostatic Precipitators*[8], and the inspector may want to review those resources for further information (see Section 1 for information on obtaining these materials).

- *Opacity CEMS data.* First, check the operating condition of the opacity monitor by assuring that daily QA/QC checks are within acceptable limits. The inspector can review the most recent calibration data or request that the monitor be placed in the calibration mode with respect to zero and span. Average opacity monitor readings also can be compared with average Method 9 VEO values for identical periods. A major deviation between the values may indicate possible monitor error.

If the monitor appears to be functioning properly, compare the opacity CEMS data with the permitted opacity limit. Even if the CEMS data are below the permitted opacity limit, the inspector also should conduct a baseline analysis by comparing the average opacity data for selected days with respect to baseline values for the same process operating load. This type of comparison can identify emission problems before opacity exceedances occur and possibly before damage has occurred to precipitator components. Check with mill personnel to determine which DCS utilities may facilitate this type of analysis. Where average opacities are significantly above baseline levels, the inspector should conduct a level 2 follow-up inspection of the ESP (outlined in Figure 5-7).

! *T-R set electrical data*. Each of the T-R sets is connected to a control cabinet that contains all of the electrical meters necessary to evaluate the operating conditions inside an electrical field. The inspector should therefore determine at the outset how the T-R sets and control cabinets are arranged. After having determined the layout of the T-R sets, the inspector should record the electrical data for each chamber, as indicated by the corresponding meters, starting with the set closest to the inlet and moving toward the set closest to the outlet.

NOTE! The example assessment form in Appendix E includes an example format for collecting T-R set data.

The voltage, current, and spark rate for each of the chambers should be compared against baseline data from the most recent performance test. If the data indicate that all or most of the fields in a chamber have shifted in the same direction at about the same time, a shift in the prevailing resistivity range has probably occurred. When only one field is inconsistent with others in the same chamber, however, it is more likely the result of mechanical or electrical problems inside that field. Note that, because of the prevalent use of saltcake as a make-up in the chemical recovery process, high resistivity problems are generally less of a concern for recovery furnace ESPs than for other ESP applications.

Where the T-R set data indicate that impaired electrical conditions exist due either to resistivity shifts or component failures in one or more fields, the inspector should proceed with a more thorough inspection of the ESP. Suggested level 2 follow-up inspection techniques that correspond to specific symptoms are summarized in Figure 5-7.

The inspector also should verify that appropriate process adjustments were made during periods when portions of the ESP were down for maintenance or repairs. ESP efficiency is related to gas flow, and recovery furnace/lime kiln ESP applications should be designed to handle the maximum rated flow of the unit. If portions of the ESP are taken off-line for maintenance or repairs, the operators may have to reduce gas flow to the ESP. For the recovery furnace in particular, the inspector may want to evaluate black liquor solids firing rate and opacity data for any periods since the last inspection when the ESP was operated in this manner. Plant operator interviews can identify the appropriate periods for evaluation. Depending on the DCS capabilities, the inspector can review the necessary process parameter and opacity CEMS data for the relevant period through DCS historical data or other available records. This type of review may be conducted during the inspection, or the inspector may request that copies of the relevant data be made for subsequent review after the on-site inspection.

Figure 5-7
ESP Level 2 Follow-up Inspection Points and Techniques[9]

Symptoms	Inspection Points	Inspection Techniques
! Frequent opacity spikes ("puffing") ! Currents are low in isolated areas ! Resistivity is particularly high or low	Rapper Operation	! Inspect rappers to determine if they are working ! Compare rapper activation frequencies with opacity spiking frequency indicated by opacity monitor ! Note any need to adjust rapping frequencies and intensities for resistivity conditions in each portion of precipitator
! General indications of poor ESP performance	Alignment Records	! Review collection plate/discharge electrode alignment records ! If resistivity is moderate-to-high, collection plate-to-discharge electrode spacing should be approx. $x \pm 0.05$ in., where x is the design spacing ! If resistivity is low, spacing can be $x \pm 1.0$ in.
! T-R set electrical data indicate that chronic problems have resulted in temporary loss ("tripping") of fields	Component Failure Records	! Evaluate component failure records to identify underlying causes
! Increased inlet to outlet temperature drop. Normal drop generally ranges from 5-25 degrees C ! Increased O_2 from inlet to outlet. Increases of >0.5% may signal a problem	Air Infiltration	! Listen for characteristic air rushing sound ! Look for areas of corrosion around the unit ! Compare inlet and outlet temperatures, checking for a significant increase in baseline value for temperature drop across the unit ! Compare inlet and outlet O_2 concentrations (if available), checking for a significant increase in concentration
! Consistently high amount and duration of excess emission periods	Start-up/Shut-down Procedures	! Review opacity monitor records to ascertain start-up/shut-down frequency ! Check to see if precipitator is energized in a reasonable time after start-up of recovery furnace (excessive time periods before energizing cause very high particulate emissions)

Wet scrubbers. Particulate emissions from lime kilns most often are controlled by venturi scrubbers, while smelt dissolving tank vents are generally controlled by low-energy scrubbing systems.[7,12] A basic level 2 inspection of these wet scrubbers involves a combination of visible emission observation of the stack plume, a check of control system parameters, to the extent data are available, and visual check of the control device:[7]

- *Conduct a VEO.* Condensed water droplets likely will interfere with Method 9 VEOs of emissions from a wet scrubber. The inspector still should conduct a qualitative observation to check for obvious emission problems.

- *Obtain operating data from the available control system monitors.* Typical parameters that may be monitored include pressure drop across the scrubber and scrubber liquid supply pressure (monitors required under NSPS and MACT), as well as inlet and outlet gas temperature, and, in some cases, scrubber water temperature.[7,10] As part of this evaluation, the general operating condition of the monitors should be considered. Under the NSPS and proposed MACT rules, the inspector should assure that the facility can verify that the accuracy requirements for pressure drop and liquid supply pressure monitors are satisfied. If these requirements do not apply, the inspector should interview operating staff to determine if any self-imposed QA/QC procedures are followed; if so, those results may be checked. Without QA/QC data, only a qualitative judgment as to the monitor condition can be made, and the final assessment report should note this limitation.

  To the extent possible, the monitoring data obtained during the inspection should be compared not only with any parameter excursion values established by permit or the proposed MACT rules, but also with values from the design, baseline, or previous inspections to determine if there has been a significant change in performance of the scrubber or in the number of control equipment malfunctions. For low-energy scrubbing systems, performance can change significantly with only a slight shift in pressure drop.[7]

- *Check physical condition.* The inspector should visually check the scrubber and surrounding areas for any physical evidence of scrubber malfunction, such as the droplet reentrainment indicators listed in Figure 5-8.[7] This type of assessment is particularly important if the other assessment techniques indicate a potential problem.

If the basic assessment indicates potential compliance problems, the inspector should conduct appropriate follow-up assessments. Figure 5-8 summarizes a few of the more common indicators of suboptimal scrubber performance, as well as suggested follow-up inspection points.

Figure 5-8
Indicators and Possible Causes of Suboptimal Scrubber Performance[9]

Indicators of Suboptimal Performance	Potential O&M Causes
Droplet reentrainment, as evidenced by: ! Obvious fallout of solids-containing droplets within 50 yards downwind of stack ! Discoloration of adjacent surfaces ! Mud lip around stack ! Heavy drainage from open ports on stack ! Ice buildup on structural steel and adjacent surfaces near stack (during cold weather)	! Mist eliminator cleaning frequency (solids build-up on mist eliminator can cause droplet reentrainment)
Significant decrease (more than several inches) in static pressure drop during peak gas flow periods	! Erosion of adjustable throat mechanisms ! Intentional changes in position of adjustable throat mechanism ! Decrease in gas flow rates ! Severe decrease in recirculation liquid flow rate
Decrease in liquid flow rate such that liquid-to-gas ratio is significantly below baseline level	! Decrease in liquid supply header pressures at scrubber inlet ! Decrease in recirculation pump discharge pressures ! Pipe freezing or blockage ! Centrifugal pump cavitation
Outlet gas temperature more than 5°F to 10°F above adiabatic saturation temperature (indicates poor gas-liquid distribution)	! Higher-than-normal supply header pressures ! Apparent pipe or header freezing ! Malfunctioning adjustable throat linkages or actuators

Evaluation of proper operation of process equipment. The inspector also should check process parameters to assure that the process equipment is properly operated and maintained. This type of process evaluation is especially important where potential excess emissions are suspected. Of the three emissions unit types, this type of check is the most critical for the recovery furnace.

> **NOTE! While reductions in TRS and SO_2 emissions may result from the optimization of certain process variables, operation of the recovery furnace under these process conditions can also increase uncontrolled particulate emissions.**

Recovery furnaces. The uncontrolled particulate matter and TRS emission rates from a recovery furnace depend on a number of interrelated operating variables, including:

- Firing rate
- Black liquor heat value
- Black liquor concentration (solids content)
- Total combustion air (primary and secondary air)
- Char bed temperature

Figure 5-9 summarizes some of the more common O&M practices related to these variables that may result in an increase in uncontrolled emissions.

Figure 5-9
Recovery Furnace O&M Practices Affecting Uncontrolled Emissions

Operating Parameter	Emission Concern	O&M/Assessment Technique
Firing Rate	Higher-than-design firing rate (flue gas volume) leading to: ! increased uncontrolled PM emission rate and concentration ! nature of particulates altered ! increased TRS emission rate ! decreased ESP efficiency	Establish baseline comparison of boiler firing rate and (1) grain loading air volume and (2) temperature at the ESP. These monitor parameters would be expected to increase with increased firing rate
Black Liquor Heating Value and Solids Content	Increased black liquor heating value/solids content leading to increased PM emission rate, especially for heating value increases	Difficult to control/evaluate due to significant daily variations. Ensure inlet grain loading remains within allowable variation for specific ESP
Total Combustion Air (excess air) (includes primary and secondary air)	Insufficient total combustion air leading to "black out" (incomplete combustion)	Check total amount of combustion air -- the amount needed for complete combustion is normally between 110 and 125 percent of theoretical air
	Total combustion air greater than 125% of calculated theoretical (stoichiometric) air leading to: ! increased PM emission rate ! increased flue gas volume to ESP ! increased SO_3 formulation, causing particulates to become sticky and to build-up on ESP collection plates -- reduces ESP power input and efficiency Primary air exceeding 45% of total air volume leading to: ! sharp increase in PM emission rate ! increased TRS emission rate	Graph (using DCS if possible) the relationships between percent excess/ primary air and: ! particulate loading to ESP ! visible emissions observed from ESP ! air volume to ESP ! flue gas temperature to ESP Also, check electrical data -- possible indicators of buildup on ESP collection plates include high secondary voltage (> 50 kV) and low secondary current (< 100 mA) in inlet fields
Char Bed Temperature	Increased char bed temperature leading to: ! increased PM emission rate ! increased flue gas volume to ESP	Assure proper combustion air and firing rate operation using techniques outlined above

Smelt dissolving tanks. To control TRS emissions from smelt dissolving tanks, the water used in the tanks and the associated scrubbers should contain minimal amounts of reduced sulfur compounds. If an odor problem from the smelt dissolving tank is suspected, the inspector should obtain measurement data for the concentration of reduced sulfur compounds contained in the inlet water and scrubbing liquid.

Lime kilns. If there is an indication of a problem with the TRS or particulate emissions from the lime kiln, the inspector should check the kiln rotation rate and O_2 levels exiting the kiln. Operation outside of normal operating ranges could increase emissions. In addition, if a permit limits the type and/or quantity of fuel for the kiln, fuel usage data may be reviewed to verify that the permit levels are satisfied. Finally, as discussed in Section 5.4, proper operation of lime mud washers is important for proper operation of the kiln. To the extent emission problems in the kiln are occurring, an analysis of the lime mud washers may be necessary to determine the cause of the problem. Figure 5-10 summarizes these considerations.

Figure 5-10
Primary Lime Kiln O&M Practices Affecting Uncontrolled Emissions

Operating Parameter	Emission Concern	O&M/Assessment Technique
Kiln rotation rate	Increases above normal operating ranges can increase emissions	Compare rate to normal baseline rates using process monitor
O_2 level	Increases above normal operating O_2 levels exiting the kiln can increase emissions	Compare O_2 levels to normal baseline levels using O_2 process monitor, if available
Mud sodium content	Increased sodium in lime mud because of mud washing problems can lead to increased H_2S emissions and fine particulates	Check sodium content of lime mud entering kiln. Generally, should be in 0.5-1% range; 2-2.5% indicates likely problem

Asbestos NESHAP compliance evaluation. Finally, the on-site inspection provides an opportunity to screen for compliance with asbestos demolition and renovation (D&R) notice requirements. The inspector should interview mill personnel to determine whether any maintenance, repair or similar construction activity conducted since the last inspection involved insulated piping or similar locations likely to involve asbestos-containing materials, and, if so, whether asbestos compliance issues were considered and properly addressed. Obtain copies of any notice provided concerning the D&R activities. If there was activity but no notice was filed, follow-up to determine whether asbestos-containing materials were involved, and if so, whether the applicability provisions of Subpart M were triggered -- see the summary of Subpart M requirements in Figure 5-5. Also, verify that the wastes containing the removed asbestos-containing material were properly sent to a waste disposal site that meets the requirements of Subpart M. The mill should have copies of all waste shipment records required under Subpart M.

For asbestos D&R inspections conducted in response to an asbestos D&R notification, see the procedures outlined in applicable Agency guidance, such as *Guidelines* *for Asbestos NESHAP Demolition and Renovation Inspection Procedures* (EPA 340/1-90-007, November 1990).

5.3.4 EPCRA Issues

NOTE! See Appendix D for overview of EPCRA regulations and basic assessment procedures.

General concerns. The basic regulatory requirements for EPCRA are not process-specific but rather apply on a facility-wide basis. Thus the basic requirements of EPCRA are discussed in Appendix D.

For the major air emission points in the chemical recovery area, the key EPCRA issues will be to quantify releases of toxic chemicals to the air, water, or land in the annual Toxic Release Inventory (TRI) report (known as the "Form R" report), and to comply with emergency reporting requirements. The emergency reporting requirements apply under both EPCRA and CERCLA. The releases subject to these emergency reporting requirements are releases that are not federally permitted and that exceed certain reportable quantities. For certain releases that are "continuous" and "stable in quantity and rate," the mill may be able to use special reporting options so that a notice is not required after each such release. See the discussion of continuous releases in Appendix D for further detail on the differences between standard emergency reporting and reporting of continuous releases.

For this process area, the air emissions from the recovery boiler and lime kiln are one potential source of releases that could be subject to EPCRA and CERCLA emergency reporting. These emissions units likely will emit the following air pollutants (and may emit others) that are listed chemicals subject to emergency reporting under CERCLA and/or EPCRA (reportable quantity in lb/24-hour period is also provided):

- Sulfur dioxide (500 lb)
- Nitrogen dioxide (10 lb)
- Hydrogen sulfide (100 lb)
- Methyl mercaptan (100 lb)
- (See other potential chemical releases associated with kraft pulp mill air emission sources listed in Appendix D)

The determination of what constitutes a "federally permitted release" can be complex. However, it is important to note that if the mill as a matter of normal operations emits an applicable pollutant in amounts that exceed the reportable quantity **and** there is no emission limit established for the pollutant, then the emergency reporting provisions likely apply. For instance, a mill should file appropriate emergency reports if no NO_x emission limit applies to the recovery boiler or lime kiln, and the unit normally emits more than 10 pounds of NO_2 in a 24-hour period. In this circumstance, the reduced continuous release reporting options likely are available, as discussed in Appendix D.

Inspection considerations. The EPCRA compliance assessment generally will focus initially on a records review. The inspector should review the following materials:

- *Emergency preparedness information*. These obligations are not process-specific, and thus the basic assessment considerations are covered for all facility operations in Appendix D to this manual.

- *TRI Form R*. Check to ensure that the form is on file, and that the source has adequately considered releases associated with the recovery furnace, smelt dissolving tank and lime kiln. Also, ask to see the estimation technique being used. If the estimation technique involves an assumed reduction efficiency for control methods, make sure that the assumed efficiency is consistent with the overall efficiency that the mill is achieving. The overall assumed efficiency should account for any excess emission releases in a manner consistent with the actual percent of operating time such releases occur. Uncontrolled emission episodes or periods of reduced control efficiency can have a significant impact on the estimate of total releases.

- *Emergency notifications*. Request documentation that the mill has filed all required notices.

If an agency air inspector plans to screen for EPCRA compliance, the inspector should confirm the necessary information with the facility contact during the opening conference or just in advance of the closing conference. For an announced inspection, the inspector should ask the source to have ready EPCRA-related documentation so that the screening check can be performed without interrupting the main focus of the inspection. A screening checklist is included as part of the example assessment form in Appendix E.

In addition to a screening-type records review inspection, an EPCRA inspector may want to conduct further assessments to identify potential compliance concerns with emergency notification requirements. As one technique, the inspector first can check excess emission reports, malfunction reports, and citizen complaints since the previous inspection. The inspector then should cross-check those incidents with notification records identified in EPA's ERNS database, records on file with the state/local emergency coordinator, or records requested from the mill. If this type of investigation identifies episodes of abnormal emissions in which no notification was provided, the inspector should consider a follow-up investigation to determine if reportable quantity thresholds were exceeded.

5.4 Other Miscellaneous Equipment Systems

There are a number of handling, storage and other process equipment systems in the chemical recovery area. These equipment systems generally involve some particulate air emissions as well as the primary wastewater and solid waste discharges associated with the recovery area. This section first provides a brief overview of the various equipment systems involved, and then discusses, respectively, air, water, RCRA and EPCRA/ CERCLA regulatory issues and inspection procedures for these miscellaneous equipment systems.

5.4.1 Emission/Discharge Points

As noted on Figure 5-1 (the equipment system diagram in Section 5.2), there are a number of small equipment systems within the chemical recovery process. The most important of these systems for environmental compliance include:

- *Green liquor preparation.* The green liquor produced in the smelt dissolving tank contains "dregs," or insoluble impurities. These dregs are removed in the green liquor clarifier and then washed in a dregs washer. The wash water is pumped to the mud washer, while the washed dregs are handled as a solid waste. The dregs may be landfilled or included with wastewater sent to the wastewater treatment plant.

- *Slaker/causticizers.* The clarified green liquor is pumped to storage for introduction into the slaker. The green liquor and lime react to form sodium hydroxide and calcium carbonate. Unreacted material ("slaker grit") is removed by a mechanical rake and must be handled as a solid waste. The causticizers are used to carry the reaction to equilibrium; reacted material is pumped to a clarifier to separate the lime mud and the white liquor.

- *Lime mud washers.* Lime mud washers are used to reduce the sodium and sulfide content of the lime mud before its use in the lime kiln. The waste wash water can be used to dissolve smelt in the smelt dissolving tank and/or as a scrubbing medium for air emission scrubbers. The mud washers also have their own air emission controls. As noted above, process upsets resulting in poorly washed mud can have adverse impacts on the lime kiln TRS emissions.

- *Storage and handling equipment*. Raw material storage and handling systems in the chemical recovery process area are another potential source of air emissions. These systems include the silos and conveyance systems for raw lime and the conveyor used to handle hot lime from the lime kiln. Depending on the mill, these systems may be open or enclosed and use different conveyance techniques. The most common control device used for these systems are hooding and venting to a fabric filter.

5.4.2 Applicable Air Regulations and Inspection Techniques

These miscellaneous source are generally not subject to significant regulation, and neither NSPS or NESHAP regulations apply. However, at least one State (VA) does have a specific regulation for slaker particulate matter emissions and most states will have at least generic opacity standards that will apply to these systems. Because these equipment systems are a relatively low priority, a basic screening check is the most likely assessment technique for an agency inspection. Basic process and (less likely) control device parameter data may be available in the lime kiln control room. The following streamlined procedures should be considered:[10]

- *Slaker/Causticizers*. The slaker and causticizers are often ducted together. Air flows from these units generally have low volume and low concentrations. If there are any controls, the controls often will consist of simple equipment such as a spray nozzle. As a screening check, verify that the controls are operating, and then conduct a visual opacity check if warranted.

  Note that the green liquor storage tanks may be subject to volatile organic liquid storage tank requirements under subpart Kb of the NSPS (for new/modified tanks after 7/23/84). As discussed in Section 4.6.1 in the context of turpentine and black liquor storage tanks, the only Subpart Kb requirement that is likely to apply is a requirement to maintain records of the design capacity of the tanks.

- *Mud washers.* The mud washers will have their own controls. These systems are small and vulnerable to upset conditions. General opacity requirements may apply and can be checked. Because the systems are small, monitoring data will be lacking but, if available, an inspector can check hood static pressure data (to make sure the hoods are collecting the emissions) and pressure drop or liquid flow rate for scrubbers. Process data on mud feed rate and sodium content of mud feed to the kiln can also be checked to determine if the washers are operating properly. A sodium content of 0.5 to 1% would be considered typical; a content of 2 to 2.5% generally indicates a potential process problem.

- *Storage and handling equipment.* The storage silos, bucket elevators, and similar equipment at many mills will have small fabric filter controls. The inspector should conduct a brief visual screen for fugitive emissions. If a problem is suspected, a full Method 9 test can be conducted. In addition, the inspector may ask to see any pressure drop or flow data that the source maintains for these control devices. For a source assessment, a useful tool would be to employ a fluorescent dye test as a routine inspection technique. A small quantity of colored dye is injected in the inlet duct of a negative pressure fabric filter, and then the area being tested is taken off-line. A black light can then be used on the clean side of the bags to check for leaks.[3] This test can identify small bag problems and reduce bag failure rates.

5.4.3 Applicable Water Regulations and Inspection Techniques

NOTE! The Cluster Rules' CWA BMP requirements for spent black liquor, turpentine and soap are discussed entirely in Section 4.6 even though some handling likely will occur in the Chemical Recovery area as well.

Air emissions from black liquor processing are controlled by the MACT standards discussed in Section 4, *Pulping Operations*. Initial black liquor processing steps, such as weak black liquor storage and evaporation, may be located in or near the pulping area. Later steps, such as soap skimming and turpentine recovery, may be located in or near the chemical recovery area. Regardless of where these processes are located, leaks, spills, and intentional diversions of black liquor, soap, and turpentine can interfere with the operation of biological wastewater treatment systems. For this reason, the Cluster Rules establish Best Management Practices (BMPs) requirements to limit these leaks, spills, and intentional diversions. See Section 4.6 for a discussion of these requirements.

Other wastewaters associated with the chemical recovery area are generally reused in the chemical recovery process or for air pollution control, and only limited flows are discharged to the wastewater treatment plant. Thus, with the exception of the BMPs, the Clean Water Act compliance assessment concerns related to wastewaters generated in the chemical recovery area will be addressed at the wastewater treatment plant.

Note that discharges (including discharges of materials used in the manufacturing process) are allowed only if specifically described in both the mill's NPDES permit application and the permit itself. The inspector should verify that any mill sewering lime mud slurries during process upsets and lime mud washer maintenance activities is specifically permitted to do so. The sewering of these lime muds during upset or maintenance periods may damage or plug sludge removal devices or mechanical clarifiers. Sewering of lime mud may increase the inorganic load of wastewater treatment sludges to such an extent that incineration is not feasible, and the mill may need to dispose of the sludge on land, rather than recovering the energy value of the sludge organic content through incineration. If, during upset or maintenance periods, the lime mud is directed into surface impoundments or landfills for disposal, the lime mud may present a hazardous wasted concern if it contains free liquids and has a pH   12.5 (which most lime mud does). To avoid increases in lime mud loadings to the treatment plant, a diversion basin that allows subsequent use of the lime mud in the process can be used to avoid lime mud losses.[2]

There may be some elements of the storm water control activities at the mill that are affected by this area, and a storm water evaluation may need to consider how storm water runoff from this area is handled. Outdoor storage and handling areas are a possible source of concern that should be addressed in the management practices adopted by the mill in conjunction with a stormwater permit. See Section 9, Assessment Module for Woodyard, Papermaking and Other Operations, for a more detailed discussion of storm water issues.

5.4.4 Applicable RCRA/EPCRA Regulatory Issues and Inspection Techniques

Certain wastes can constitute hazardous wastes if they exhibit the corrosivity characteristic. To qualify, the waste must contain free liquids (>20 percent by volume) and have a pH   2 or   12.5. Some States may consider corrosive wastes to be hazardous wastes solely on the basis of pH level, and not the presence of free liquids.

In the chemical recovery area, three primary sources of wastes potentially could qualify as corrosive hazardous wastes unless the mill takes appropriate handling steps. Slaker grits and green liquor dregs are two of the three primary solid waste concerns in this area. Generally, lime slaker grits are washed in order to recover cooking and causticizing chemicals. However, at least one plant has noted that this washing process is also important to maintain a pH level <12.5 (i.e., below the pH level that is one element of the RCRA corrosivity characteristic).[5] Note also that, generally, these wastes are dewatered prior to disposal and would be able to pass a paint filter test for free liquids. The third concern is lime mud that may be sent to a surface impoundment or landfill for disposal. Generally, the mud is used in the kiln. However, during process upsets, some mud may be handled for disposal. The lime mud may fail a paint filter test and have a pH 12.5. Thus, disposal in this manner presents a possible noncomplying disposal practice.

These materials generally are landfilled on-site although there is some opportunity for beneficial reuse of the materials as a cement additive.[2] Solid waste landfill permits and requirements are issued by State agencies within the general criteria and guidelines included in 40 CFR Part 257. One concern is potential leachate from on-site solid waste landfills. It should be noted that if the leachate is commingled with other process wastewaters and sent to the wastewater treatment plant, the landfill leachate would constitute "process wastewater" and be part of the wastewaters subject to the NPDES permit for the facility (see 40 CFR 430.01 (m)). The inspector must identify the specific State permit requirements before conducting the inspection. On-site landfill issues are addressed in Section 9, Assessment Module for Woodyard, Papermaking and Other Operations.

For EPCRA, the primary concern will be to ensure that the TRI Form R report addresses all of the releases to the air, water and land from these equipment systems. In addition, because some of these equipment systems do emit methanol and other air pollutants (see Figure 5-2), and generally are not subject to any federal regulation or permit condition limiting those emissions, emergency reporting requirements may also apply. Note that, for EPCRA emergency reporting purposes, all releases that are not federally permitted from all units at the mill would be combined to determine whether the air emission releases exceed an applicable reportable quantity threshold. See further discussion of emergency reporting requirements in Section 5.3.4 and Appendix D.

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